the OIL AND GAS JOURNAL

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There's no letup for oil field equipment. It looms large in the building of an even more productive America—all industry's goal. As much as ever, therefore, you need the firm grip on wire line operations that *Preformed* Yellow Strand provides. Let its stout steel wires handle your heavy drill strings securely. Use its limberness to speed pipe-laying . . . to fight fatigue on winches . . . to simplify erection jobs. The long-lasting wire line is the *economical* line. Specify *Preformed* Yellow Strand by name.

Broderick & Bascom Rope Co.
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THE CONTINENTAL SUPPLY CO.
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PREFORMED ROTARY LINE

PRICE 50 CENTS

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MARCH 10, 1949

plus values in NORDSTROMS...
keep your upkeep down!

ALL THESE FEATURES:
and then some!

- + "SEALDPORT" LUBRICATION
- + TRIPLE LUBRICANT ACTION
  (Seals, jacks and lubricates)
- + SIMPLE ROTARY PLUG ACTION
- + QUARTER-TURN COMPLETELY CLOSES
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- + CORROSION AND EROSION-RESISTANT
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The true cost of a valve is determined by its life and cost of upkeep. The inherent simplicity of a Nordstrom and the protection to its internal operating surfaces insure longest life, fewest replacements and most economical repairs when and if needed. Keep upkeep down with Nordstroms.

Use only genuine Nordcoseal lubricant

Nordstrom
LUBRICATED VALVES

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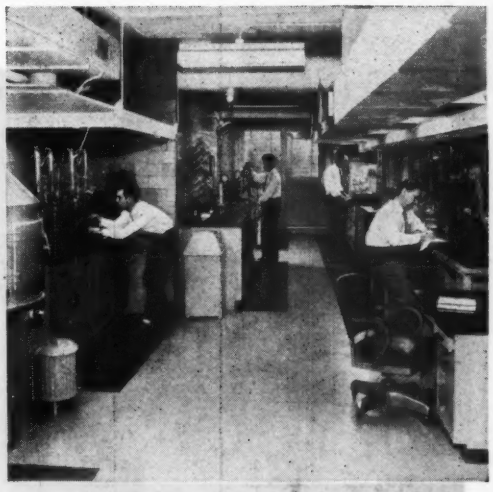
. . . a complete line to meet every need

Du Pont's complete line of gasoline additives makes it possible for you to meet your various needs—and obtain your entire requirements from one dependable source. These additives have been proved by many years use in the field. They are compatible with each other and are of uniform high quality.

Du Pont District Laboratories, one of which serves your territory, will gladly assist you in evaluating your fuel and in making the proper recommendations. Write the nearest District Office for additional information on this complete line of gasoline additives.



Chemical section of a District Laboratory. Also equipped to make octane determinations, they render many helpful services.

Tetraethyl Lead Compounds

. . . Motor Mix . . . Aviation Mix

Du Pont Tetraethyl Lead Compounds are backed by 25 years manufacturing experience. Friendly, cooperative assistance in the solution of problems involving the use of TEL are a part of the comprehensive services Du Pont offers in connection with its TEL compounds.

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Nos. 5, 6, 22

All gasolines do not have the same likes and dislikes when it comes to antioxidants. That is why Du Pont offers you three gasoline antioxidants, from which you can choose the one best suited to your gasoline.

Metal Deactivator

Copper, an unwelcome catalyst in fuels, is easily and economically controlled with Du Pont Metal Deactivator. In every case, overcoming the catalytic effect of the copper is more economical with Du Pont Metal Deactivator than an attempt at stabilization with antioxidants alone.

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Du Pont Gasoline Dyes establish the identity of your fuels. Four colors are available and the uniformity of these colors is maintained by careful control. Through mixture of two or more, a wide range of shades can be obtained.

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BETTER THINGS FOR BETTER LIVING
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Positive Performance with Fairbanks-Morse Rotary Pumps!

Simple, compact Fairbanks-Morse Rotary Pumps have a positive pumping action...a steady flow that minimizes vibration and shock...assures long, low-cost service.

With only two moving parts, these positive-displacement pumps provide efficient, economical pumping of any free-flowing liquid. There are no complicated parts to cause trouble or to require frequent adjustment and maintenance. Capacities range from 1.3 to 450 g.p.m. If you're interested in low-cost pumping, see your Fairbanks-Morse Pump Distributor or branch pump engineer. Fairbanks, Morse & Co., Chicago 5, Ill.

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You get better service wherever you see this sign

There's a *Macwhyte* Rope that's the *right* rope for your equipment. All job-proved — a thousand and one wire ropes to choose from.

Our distributors and mill depots — located at convenient points all over the country — carry stocks for immediate delivery. Ask a Macwhyte representative to recommend the rope best suited for your equipment.

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For easy handling and longer service

Use PREformed Whyte Strand Wire Rope—it's internally lubricated

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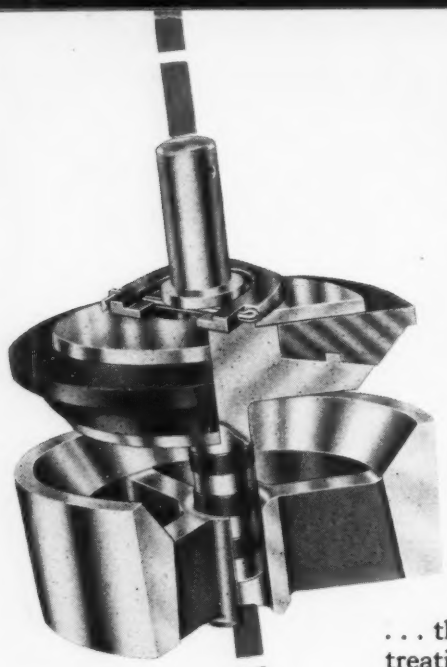


AMERICAN IRON VALVES & SEATS

HEAT TREATED

in our new controlled atmosphere furnace!

There's a *big* difference in the performance of every product that receives this advanced method of heat treating! That's why every American Iron Valve & Seat is heat treated in our new controlled atmosphere furnace. First comes the quenching furnace (shown below) . . . next, the oil quenching unit (right of furnace) . . . third, the draw heat furnace (at rear right). Here's a heat treating process that spells q-u-a-l-i-t-y, every step of the way! And it's another example of how—from start to finish—our valves and seats are not only *designed right*, but *made right*, for long-lasting, outstanding performance!

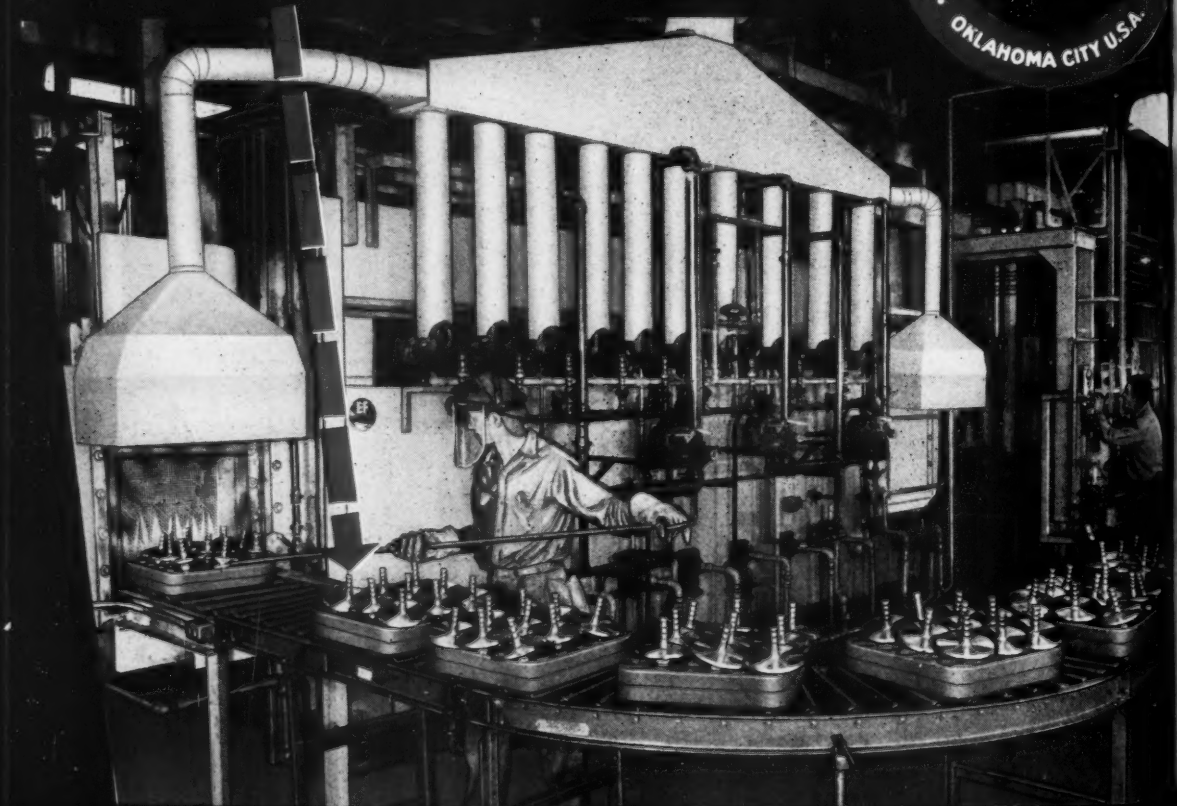
AMERICAN IRON & MACHINE WORKS CO.

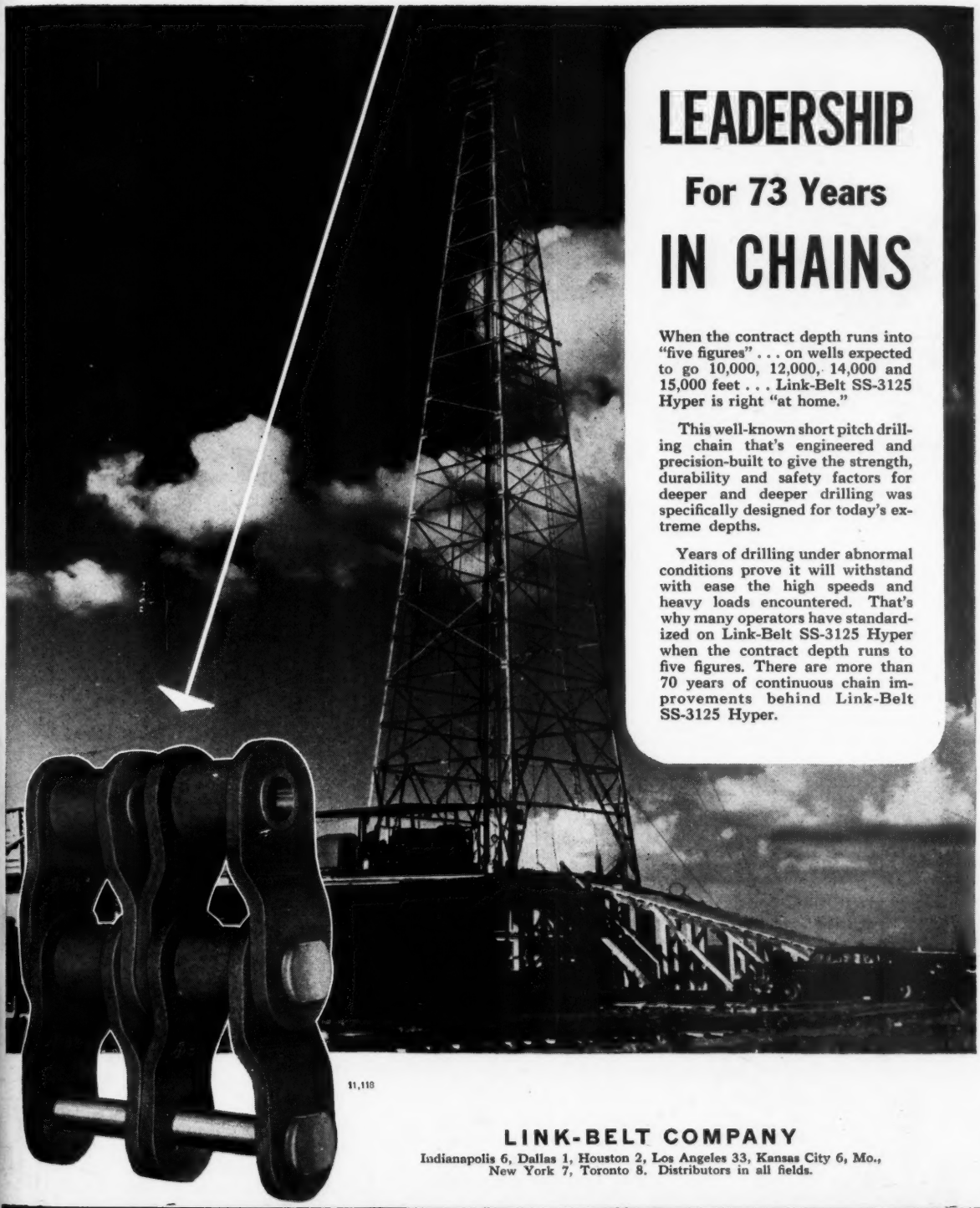
OKLAHOMA CITY, OKLAHOMA—BOX 1177—PHONE L. D. 518—DISTRICT OFFICE, HOUSTON, TEXAS

EXPORT OFFICE: 420 LEXINGTON AVE., NEW YORK CITY, N. Y.

AMERICAN IRON & MACHINE WORKS CO. A OKLAHOMA CITY U.S.A.

(below) Charging the controlled atmosphere furnace for the continuous heat-treating operation applied to every American Iron Valve & Seat.





LEADERSHIP

For 73 Years

IN CHAINS

When the contract depth runs into "five figures" . . . on wells expected to go 10,000, 12,000, 14,000 and 15,000 feet . . . Link-Belt SS-3125 Hyper is right "at home."

This well-known short pitch drilling chain that's engineered and precision-built to give the strength, durability and safety factors for deeper and deeper drilling was specifically designed for today's extreme depths.

Years of drilling under abnormal conditions prove it will withstand with ease the high speeds and heavy loads encountered. That's why many operators have standardized on Link-Belt SS-3125 Hyper when the contract depth runs to five figures. There are more than 70 years of continuous chain improvements behind Link-Belt SS-3125 Hyper.

51,118

LINK-BELT COMPANY

Indianapolis 6, Dallas 1, Houston 2, Los Angeles 33, Kansas City 6, Mo., New York 7, Toronto 8. Distributors in all fields.

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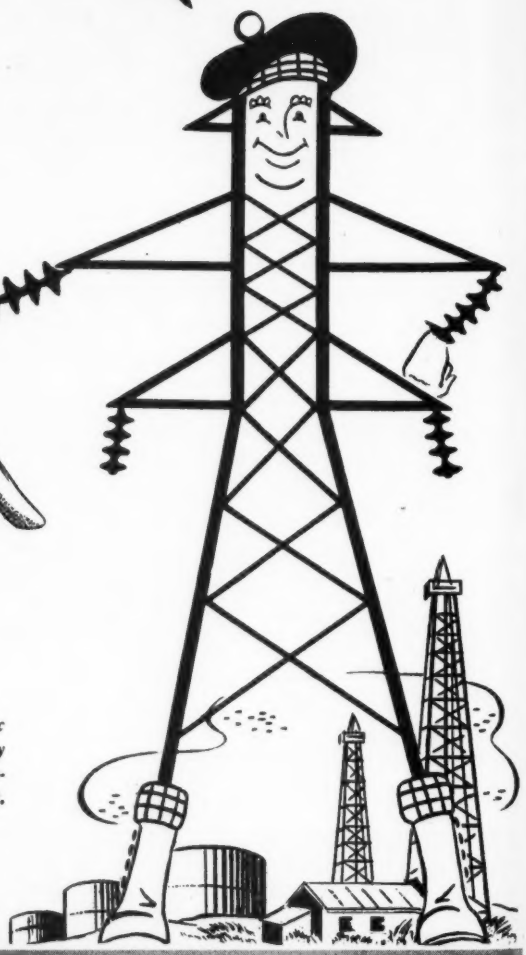
I'm up and at 'em -Fresh as a Daisy!

Switch to up-and-at-'em Utility Electric Power! LOW COST POWER is "on the dot" when you want it — no need to make further allowances for human error. LOW COST POWER is tireless — can take on a full twenty-four hour shift on a sustained operation, or work according to any fractional time chart without necessitating elaborate adjustments of crew schedules. Manpower thus released can be assigned to more directly productive duties. Better balance of payroll to other operating costs, automatic controls, lower investment in power equipment, lower upkeep, s-l-o-w depreciation, superior portability . . . these stack up "like a mountain" in favor of Utility Electric Power. It costs you nothing to discuss your LOW COST POWER needs with the Power Engineer. Make a date — call your nearest Utility Power Company now!



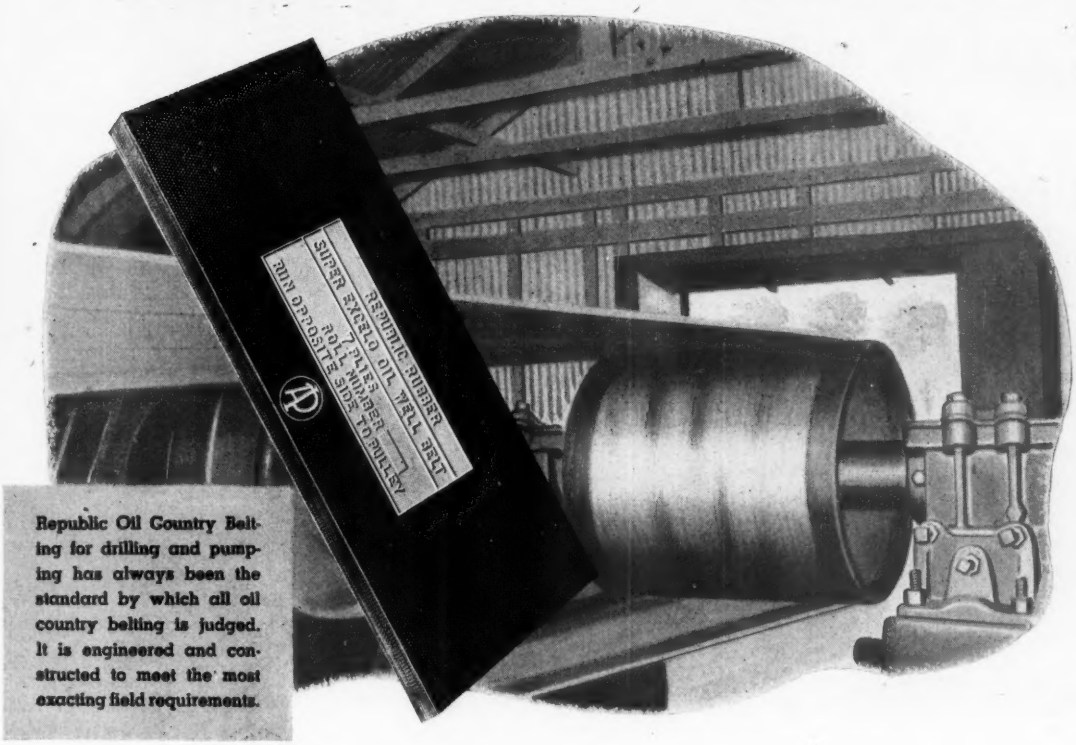
Depend upon Utility Electric Power for all-around efficiency at lowest-possible-cost maintainable by know-how management.

Use Utility Electric Power!

PETROLEUM ELECTRIC POWER ASSOCIATION

Box 1498, Oklahoma City, Oklahoma

A Distributor serves you Best



Republic Oil Country Belting for drilling and pumping has always been the standard by which all oil country belting is judged. It is engineered and constructed to meet the most exacting field requirements.

Careful "*Choosing*" by Republic Rubber Distributors *helps you*, Mr. Buyer

Quality

POINT NUMBER TWO IN REPUBLIC'S FIVE POINT POLICY

A quality of product uniformly good and capable of delivering service results that should reasonably be expected.

Your distributor of industrial supplies is vitally conscious of the fact that he with his manufacturers are responsible for the products he sells. He chooses with care not only the products upon which he can rely but also the manufacturers upon which he can depend. For these reasons, Republic Rubber Division is the favorite source of many distributors of industrial supplies.

Thus, your distributor becomes a good source of supply. It will pay you to use his "selected" inventory items.

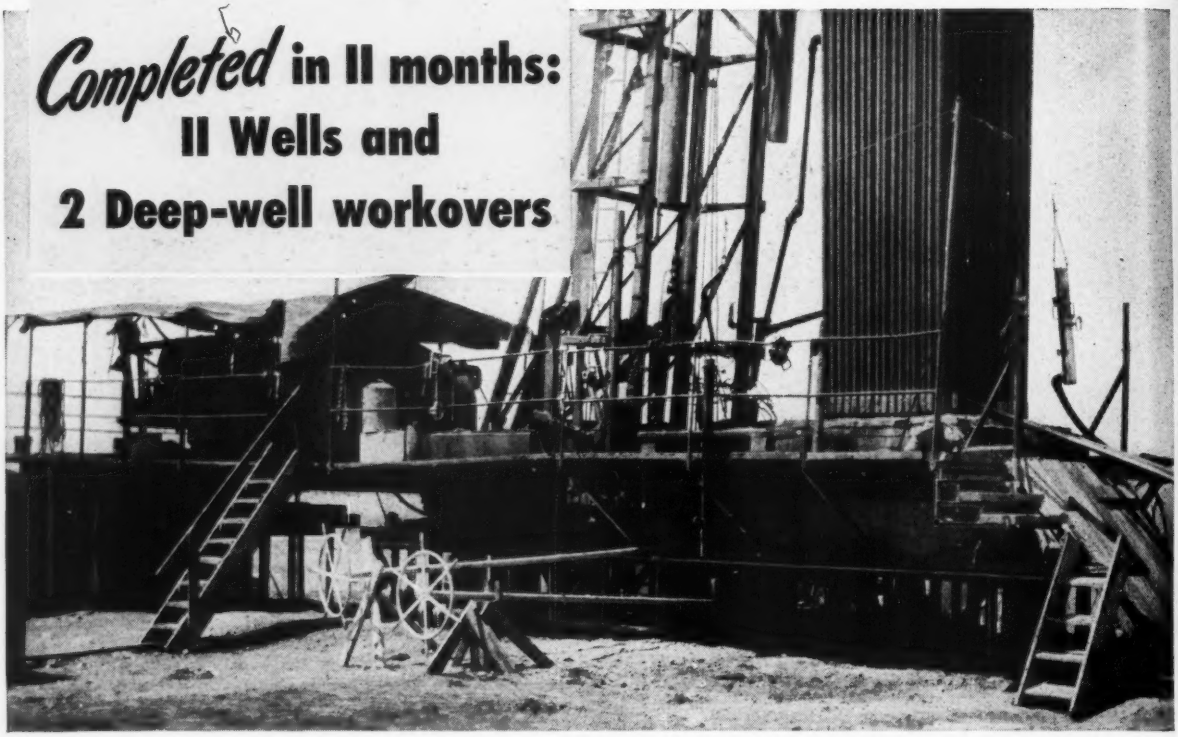
A QUARTER CENTURY OF PROGRESS

MECHANICAL RUBBER GOODS BY

REPUBLIC RUBBER DIVISION

REPUBLIC RUBBER DIVISION
LEE RUBBER & TIRE CORPORATION . . . YOUNGSTOWN, OHIO
Lee DeLuxe Tires & Tubes, Conshohocken, Pa.

Completed in 11 months: 11 Wells and 2 Deep-well workovers



Briscoe-Clingman's Ideco Rambler Rig has a 300 H.P. GM "Twin 6" driving an H-40 Hydrair Hoist, and a "Twin 6" on a separate mud pump. Engine draw works and 96-foot mast are mounted on a 34-foot trailer.

NOT long ago a well workover that called for deepening from 10,000 feet would have been considered impracticable with a mobile rig. *But that was before General Motors Series 71 Diesels and modern rigs brought their two-fisted punch into oil-well drilling.* With them came a new concept of power with mobility, speed and economy.

An Ideco Rambler Rig was used by Briscoe-Clingman Drilling Company of Oklahoma City on a recent well workover to deepen from 10,475 feet. This same rig in its first 11 months of operation drilled 11 wells in excess of 4,700 feet and worked over and deepened two others beyond 10,000.

For this kind of work GM Diesel engines are *the champs of the oil fields.* With power on every downstroke, these 2-cycle Diesels provide greater power for their size and weight. They run smoother and pick up under load faster. They're simple in design, and experience shows they're easy to maintain.

GM Diesels are available in "Singles," "Twins" and "Quads" from 30 to 520 *continuous* B.H.P. If you are interested in dependable, low-cost power for drilling, take a look at the records these Series 71 engines are making. Write for 16-page illustrated booklet, "GM Series 71 Diesel Oil Field Engines."

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES..*Up to 200 H.P.* DETROIT 28, MICHIGAN MULTIPLE UNITS..*Up to 800 H.P.*

GENERAL MOTORS

GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

GENERAL MOTORS CORP., DIESEL ENGINE SALES, PETROLEUM INDUSTRY, 1504 Philtower Bldg., TULSA 3, OKLAHOMA

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Empire Oil Field Machinery Co. ODESSA, TEXAS
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Seitz Machinery Company, Inc. BILLINGS, MONTANA
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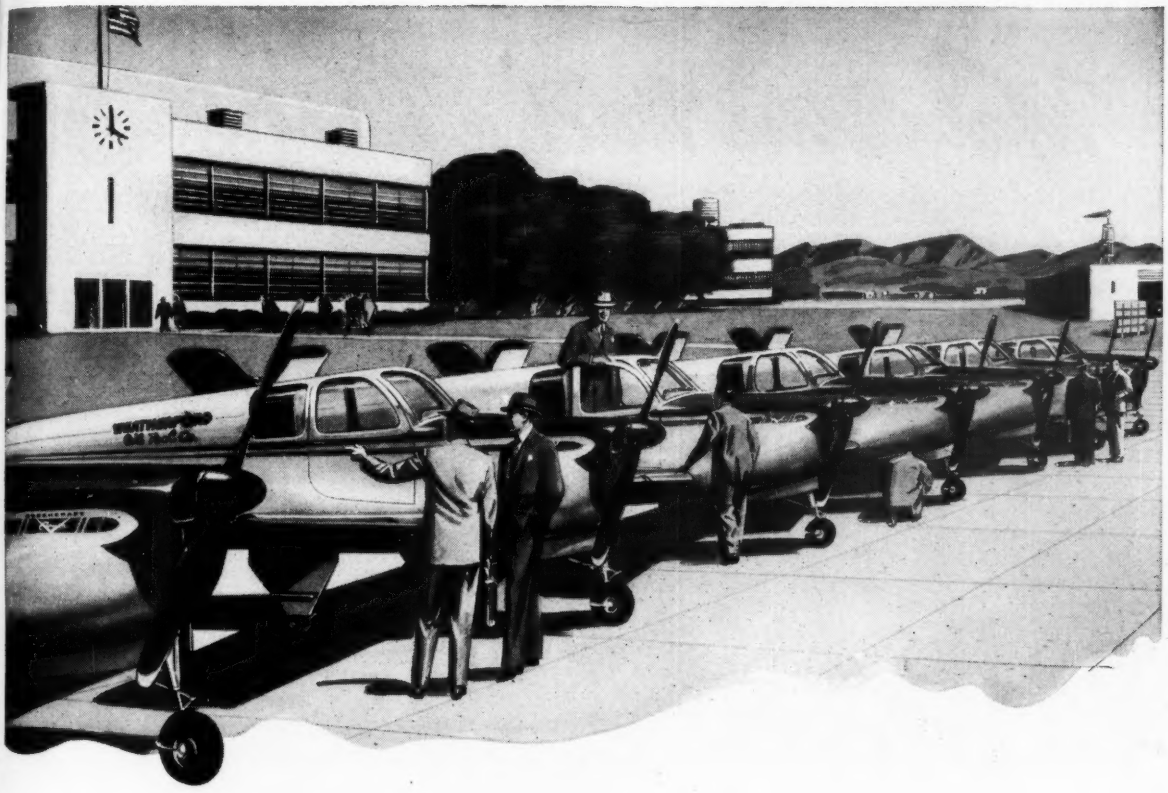


This fleet of Bonanzas makes a business go

...and grow!

Key men of Weatherford Oil Tool Company, Texas, really get around with their *seven*-plane fleet of 4-place Bonanzas. Weatherford makes oil well tools and equipment, has 38 distribution centers in ten states. The sales situation, as in many another business, calls for fast action. They get it—by Bonanza!

"Now we can increase our sales calls by 40% over those we could make by fastest public transportation," says President J. E. Hall, Jr. "If we hear of a potential sale in another state, we have a man there in hours. And customers like fast action when waiting for equipment. Oil rig time is expensive. Now our men, with equipment, get there pronto by Bonanza."

Sales Manager John Hall even uses his Bonanza as "reconnaissance"; spots well locations from the air, follows up with sales calls. Because Bonanzas are *quiet* and comfortable, they're ideal as customer transports. Cost of operation? About the same gas and oil consumption per mile as an auto! This Bonanza fleet is a profitable, *paying* proposition.

Travel on business? Investigate Bonanza Travel

Apply this revolutionary business "machine" to *your* business. It means you slice travel-time by two-thirds . . . a saving you put to *profitable* use. Investigate. A note on your company letterhead brings an informative 60-page brochure on "The Air Fleet of American Business." Write today to Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

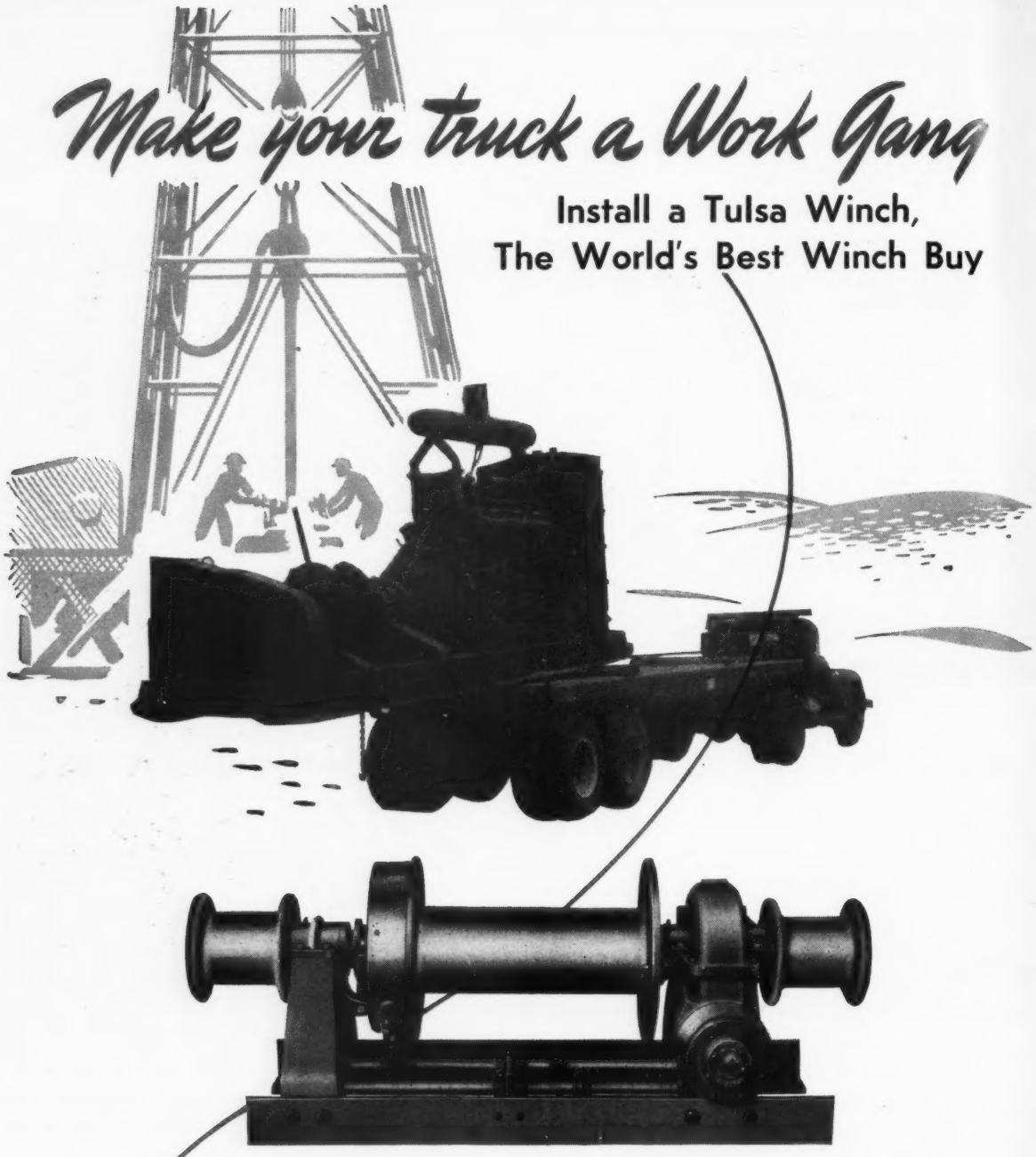
Top speed 184 mph
Cruising speed, 170 mph
Range 750 miles

BEECHCRAFT
BONANZA
MODEL A35

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Make your truck a Work Gang

Install a Tulsa Winch, The World's Best Winch Buy



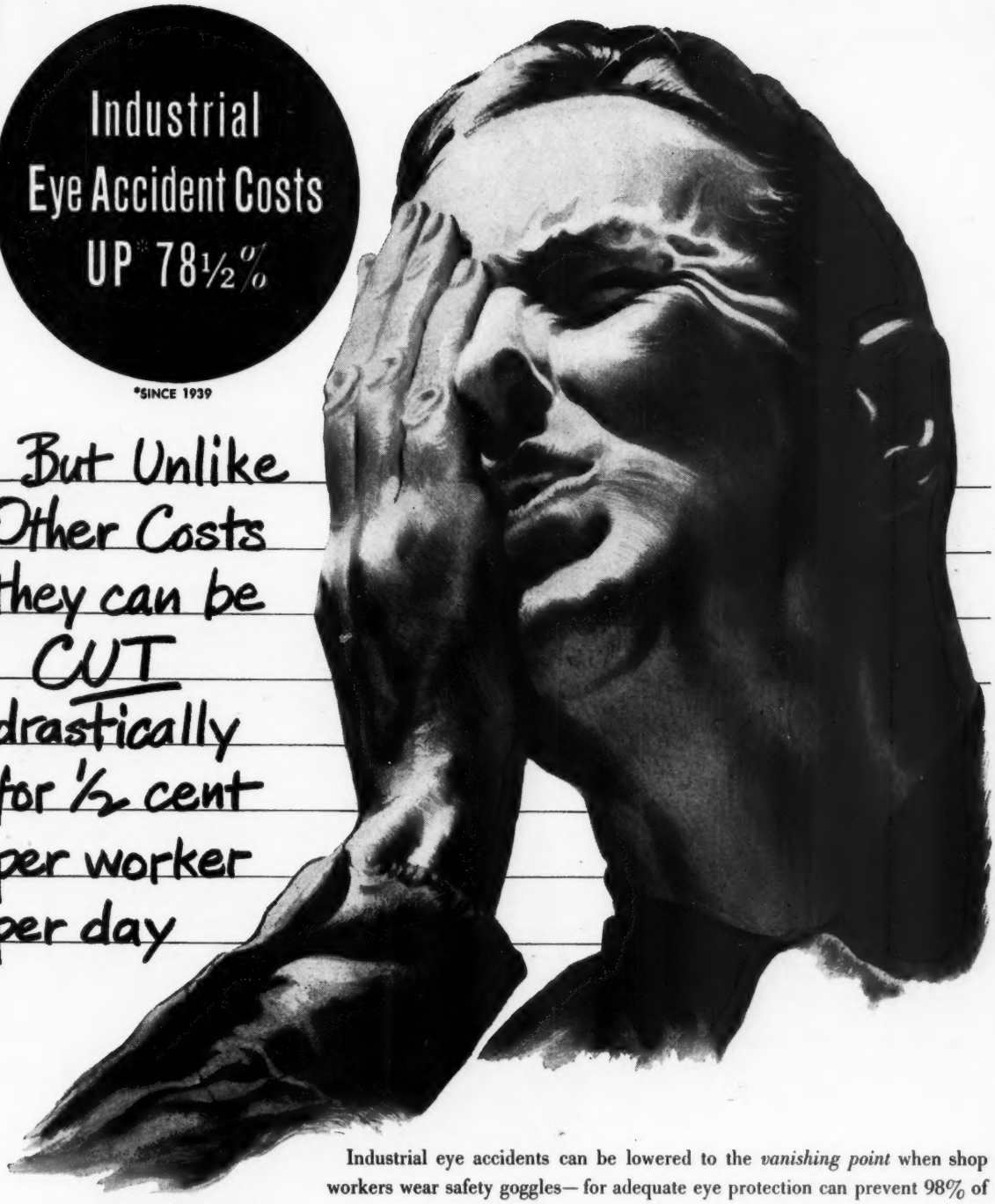
THE JOB'S A CINCH WITH A TULSA WINCH. Pull, skid, lift, hoist, load and unload safely and quickly. Yes, your truck will be a gang of reliable workmen when you have a Tulsa Winch installed. Loads will be moved more quickly and economically . . . . and much more safely . . . . with Tulsa Winch.

The Tulsa Winch exclusive Automatic Worm brake is positive accident insurance. Men and materials are safe, because Tulsa Winch HOLDS THE LOAD! Install a Tulsa Winch on your truck and do more jobs—earn more profits. Write for bulletin. Tulsa Winch, Division of Vickers, Inc., Tulsa, Oklahoma.

Tulsa Winch
TULSA, OKLAHOMA DIVISION OF VICKERS Inc.

Industrial Eye Accident Costs UP* 78½%

*SINCE 1939



But Unlike Other Costs they can be CUT drastically for ½ cent per worker per day

Industrial eye accidents can be lowered to the *vanishing point* when shop workers wear safety goggles— for adequate eye protection can prevent 98% of all eye accidents. With 1949 average hourly earnings estimated at $1.41, a pair of goggles costs less than 2 hours loss of productive time that even a minor eye accident can cause.

Your AO Safety Representative has complete facts as to what an adequate eye protection program SAVES — industry by industry, including *yours*. Ask him to call.

Safety Products Division of

American Optical COMPANY

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Magcobar's My-Lo-Jel keeps water loss mighty low

FIELD REPORTS PROVE IT!

• Magcobar MY-LO-JEL is an improved pregelatinized drilling mud starch in the form of a free flowing powder which can be added directly to the mud through a hopper mixer. It provides positive control of the filtration properties of mud even in the presence of salt, anhydrite and other contaminants. MY-LO-GEL is a blended starch that is especially processed to produce a quick acting, tough and chemically stable plugging agent to inhibit filtration of mud. Thus, it not only lowers the water loss, but keeps it low.

MY-LO-GEL is economical to use. Two to four pounds per barrel of mud is all that is needed to impart the low water loss desired of most muds. It has a stabilizing effect on mud which often greatly reduces the cost of maintenance while drilling. Low water loss muds made with MY-LO-GEL are doing much to hold down the present day cost of drilling by eliminating strings of protection casing, preventing delays due to reaming, hole trouble and fishing jobs.

MAGNET COVE BARIUM CORP.
MALVERN, ARKANSAS • HOUSTON, TEXAS
Export representative: Guy E. Daniels, 30 Rockefeller Plaza, New York 20, N. Y.

Magcobar
Complete
DRILLING MUD SERVICE
DEALER

Look for this sign **WHEN YOU NEED MUD**

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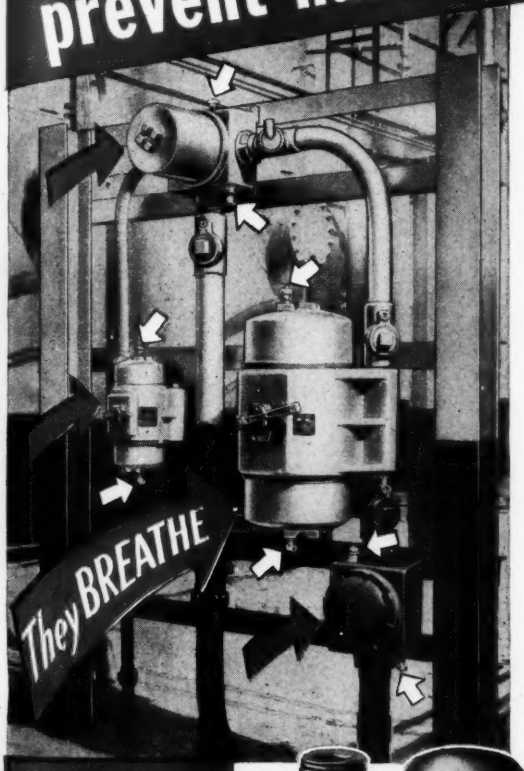
CROUSE-HINDS Breathers

prevent harmful water condensation

in explosion-proof electrical conduit systems

under humid conditions



- **FORESTALL** the formation of destructive mildew by ventilating enclosures.
- **EXTEND the LIFE** of insulation and equipment under adverse conditions.
- **MINIMIZE** the danger of expensive shut-downs due to insulation or equipment failure.

Paragraph 5015-C5 of the 1947 National Electrical Code states that *"where there is a possibility that water or other condensed vapor may be trapped at any point in the raceway system, approved means shall be provided to prevent accumulation, or to permit periodic draining of such water or condensed vapor"*

Explosion-proof electrical enclosures cannot be vented in any of the usual ways because they must be kept flame-tight. Crouse-Hinds' explosion-proof Type ECD Breathers, Type ECD Drains, and Type EZD Drain Sealing Condulets meet the Code requirements and are listed by Underwriters Laboratories for such service.

The Breathers are similar to the Drains but have metal hoods which make them water and dust shedding. Both have corrosion-resisting bodies with internal flame-tight (but not airtight or watertight) labyrinths. They can be used freely without impairing the explosion-proof integrity of a conduit system, providing they are always installed in a Condulet hub or other opening *with five or more full threads engaged.*

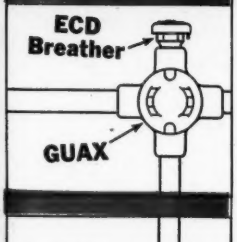
In humid atmospheres, water condensation occurs in explosion-proof systems, especially where temperature changes are frequent. Accumulation of water in harmful quantities is common. Mildew, a bacterial growth, is often present. It attacks many insulations and will destroy them unless the cause is removed. In such humid atmospheres troubles of this nature can be avoided by the proper installation of Crouse-Hinds' Breathers and Drains in conjunction with explosion-proof Condulets*.

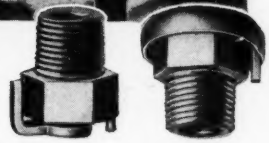
Breathers should be placed at the highest points and Drains at the lowest points of all housings and conduit runs. Heat generated by the current flowing through conductors and electrical devices raises the temperature of air within the conduit and housings. Breathers and Drains permit the resultant upward passage of the warmed air to remove moisture and thoroughly ventilate the enclosures. This prevents the accumulation of water and removes moisture that may have collected under unusual conditions.

This method is successfully used in many of the largest plants in the chemical and petroleum industries. Several years of field experience has demonstrated that the moisture is either entirely removed by ventilation, or so reduced that it is not harmful.

These devices have also been successfully used in non-hazardous locations where condensation is troublesome.

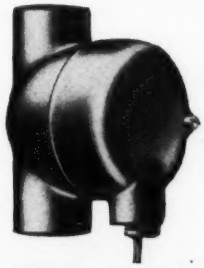
If you have a condensation problem, Crouse-Hinds Company will gladly assist in solving it. Write to





Type ECD Drain — Type ECD Breather

CONDULETS with Crouse-Hinds Breathers and Drains can be installed for ventilation throughout an entire explosion-proof conduit system



Type EZD Explosion-Proof Drain Sealing Condulet

A Nationwide Distribution Through Electrical Wholesalers

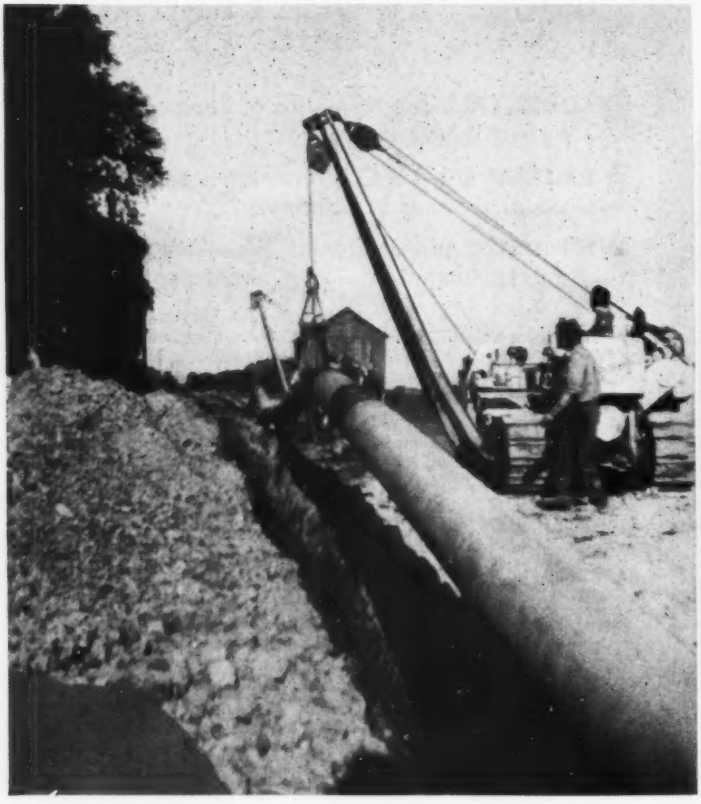
CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

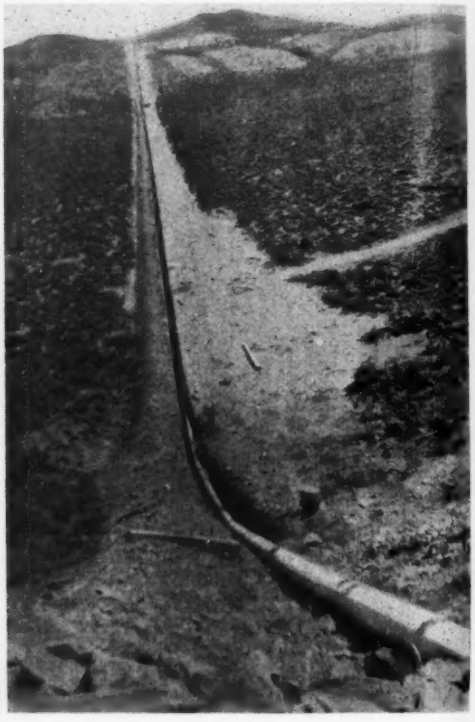
Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee — Minneapolis — New York Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Washington.
Resident Representatives: Albany — Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va.
CROUSE-HINDS COMPANY OF CANADA, LTD., *Main Office and Plant:* TORONTO, ONT.

* *CONDULETS are made only by CROUSE-HINDS*

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

THOUSANDS of INSTALLATIONS of HILL HUBBELL PIPE PROTECTION such as these the country over





PROGRESSIVE ADVANCEMENT YESTERDAY, TODAY and TOMORROW

Located in the HUB of the steel pipe producing areas for 25 years, we at HILL, HUBBELL can point in all directions to many thousands of miles of time tested coated-and-wrapped pipe installations the COUNTRY OVER that bear the trade name of HILL, HUBBELL.

Newly devised angular grit blasting machinery for the absolute cleaning of your pipe before being primed, together with advanced coating-and-wrapping methods, keeps you progressively advanced in the field of applied pipe protection at its best, at a marked savings to you.

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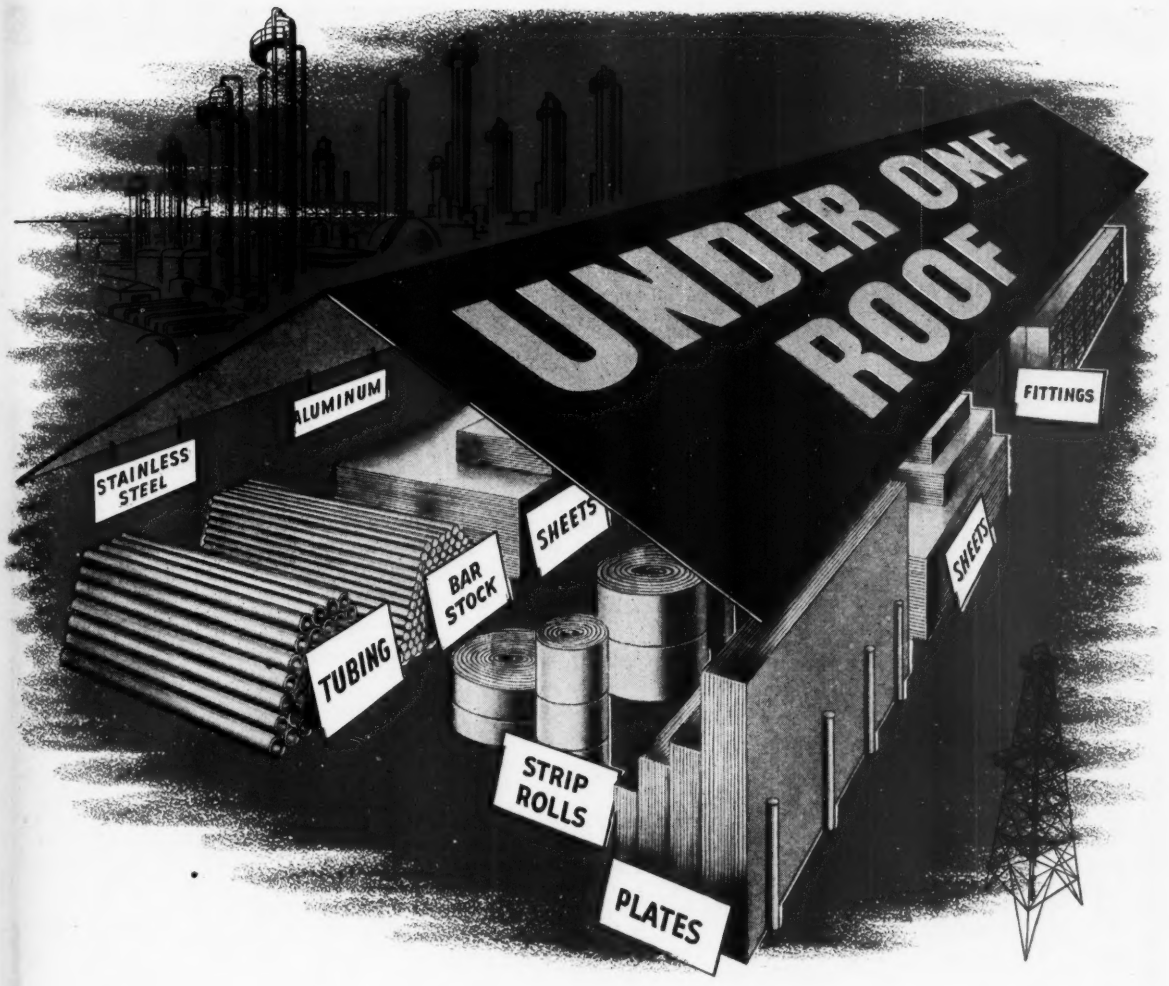

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Geared to industry's continuous demand for specialized metals, Metal Goods' one-call service is designed to make your metal procurement easier—and more efficient. By having the metals you need "on-call" from your Metal Goods warehouse—*when* you need them—you can eliminate costly metal inventories... save storage space... reduce materials handling... and gain efficiency through simplifying your supply effort.

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A Survey Was Conducted

...*A report was made*

The following are excerpts taken from an actual report of an engineering survey made by the Pittsburgh Pipe Cleaner Company for an Eastern refinery.

The test of this 20" salt water line indicated a Williams & Hazen coefficient of "C" = 58, which is sufficiently low to reveal a serious need of rehabilitation. The present delivery of this line is 8.34 M.G.D. If rehabilitated, the Williams & Hazen "C" value would conservatively be raised to 120, with an increase in flow under existing pressure conditions to 17 M.G.D.

Result of tests:

Date of test	September 18, 1948
Length of main Sta 0 + 40.50 to 11 + 07	1066′
Equivalent length of two 90° bends	100′
Total equivalent length tested	1166′
Flow in line during test	8.34 M.G.D.
Loss of head in 1166′	28′
Williams & Hazen formula "C" =	58
Calipered diameter:	
Sta 0 + 40.5	19 5/16"
Apparent thickness of incrustation	3/8"
Sta 11 + 07	19 7/16"
Apparent thickness of incrustation	9/32"
Velocity coefficients determined by traverse along diameter:	
Sta 0 + 40.5	.80
Sta 11 + 07	.82

CALL A PITTSBURGH PIPE CLEANER COMPANY ENGINEER TODAY!

Pittsburgh Pipe Cleaner Company offers Today a Complete Engineering Service available in the Industrial Water Supply and Disposal Fields

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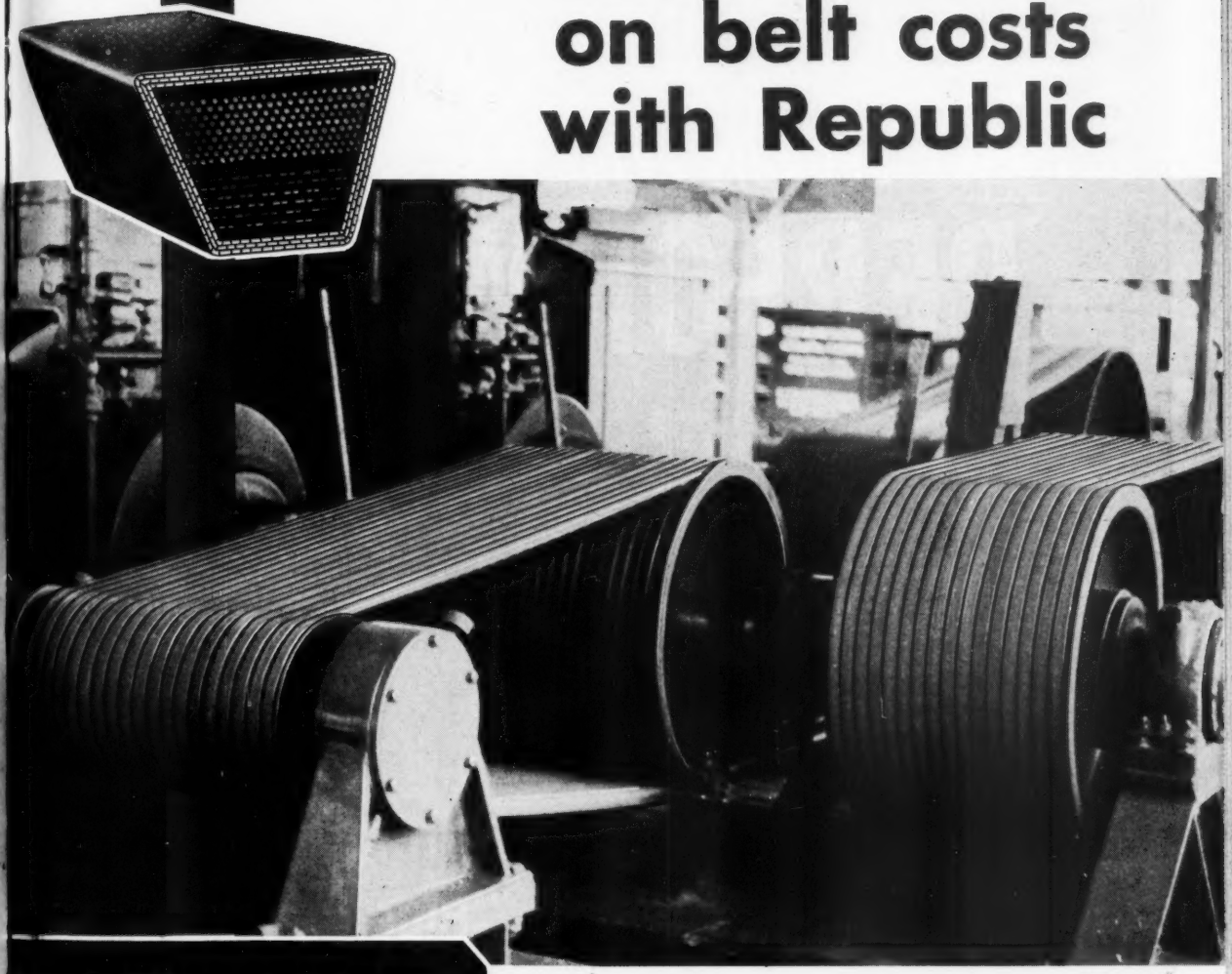
Get Ahead on belt costs with Republic



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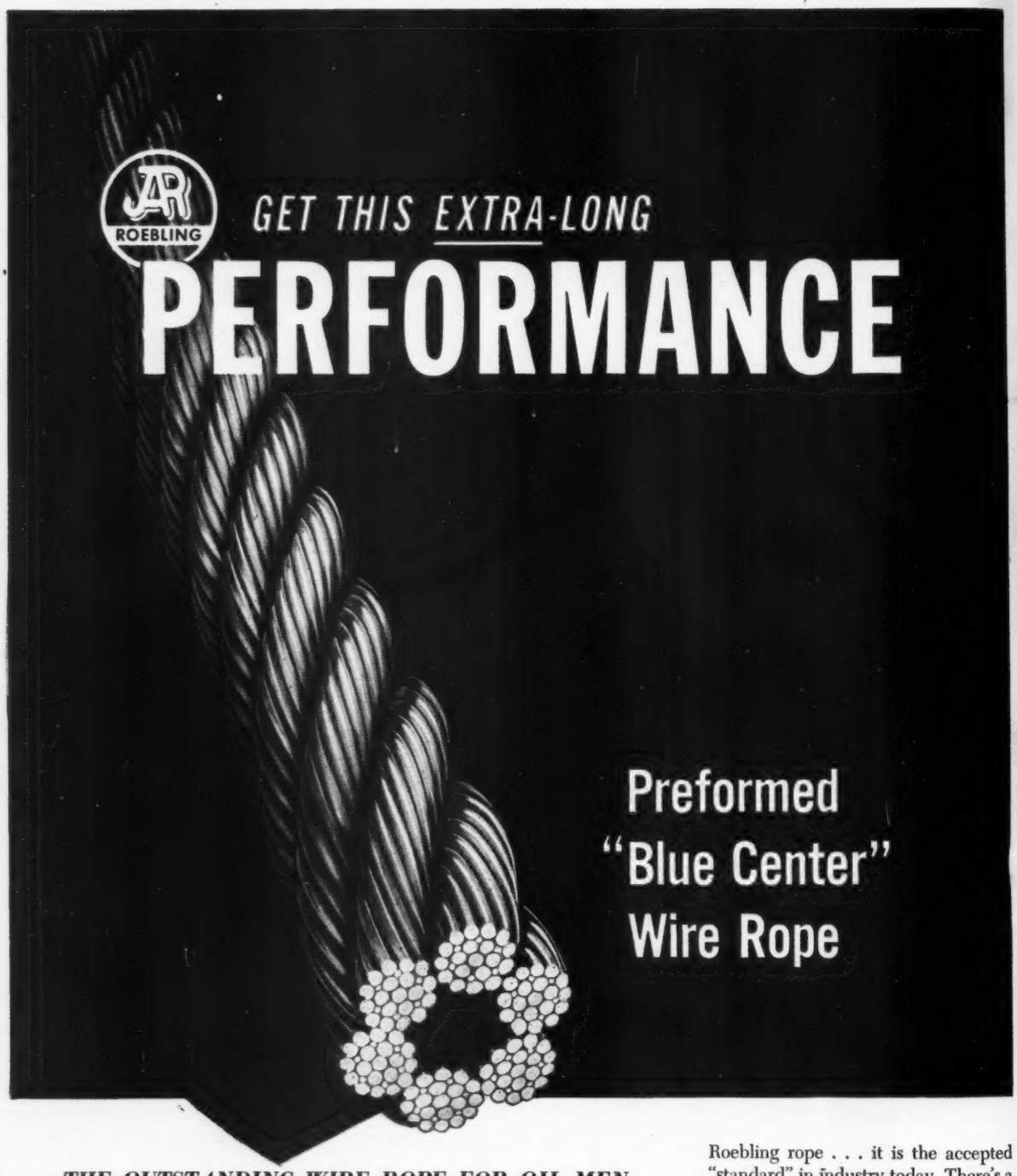

Preformed "Blue Center" Wire Rope

THE OUTSTANDING WIRE ROPE FOR OIL MEN

THE ONE THAT LASTS LONGEST ...that's the most economical wire rope you can buy! And "Blue Center" Steel—made only by Roebling—gives wire rope that *extra-long* service life. With Roebling Preformed "Blue Center" you save dollars that really count.

To this, add the other advantages of Roebling Preformed wire rope. It's not inclined to twist and kink . . . is easy to handle and install. It can be cut without seizing. Broken wires stay flat and don't injure sheaves or drums.

You can have full confidence in Roebling rope . . . it is the accepted "standard" in industry today. There's a type and size of Roebling Preformed "Blue Center" Steel Wire Rope for every purpose. Have your Roebling Field Man recommend the best one for your requirements . . . and show you economical methods of installation and maintenance. John A. Roebling's Sons Company, Trenton 2, N. J.

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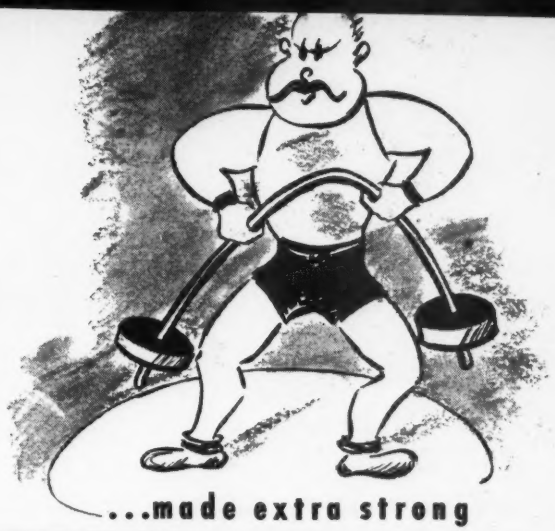
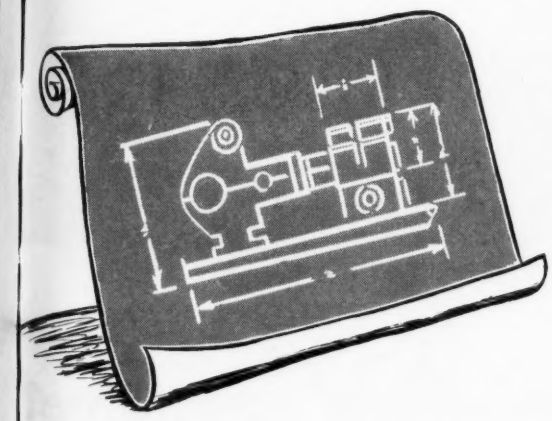
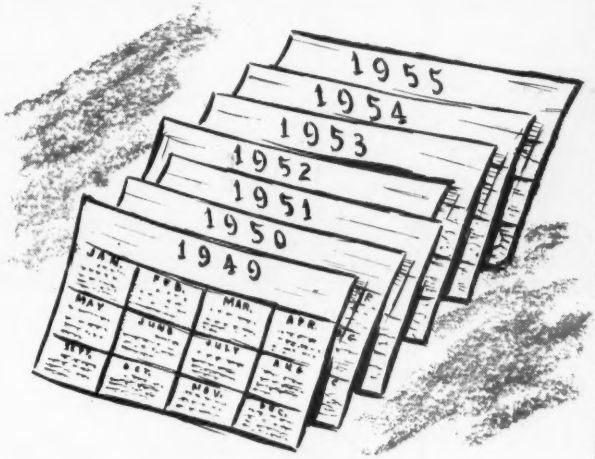
Fewer parts



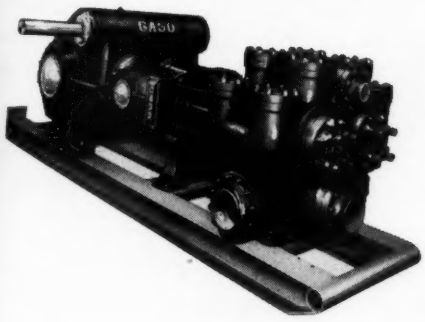
...made extra strong



+ time-tested design



= longer life



+ the utmost in pumping satisfaction

Simple Arithmetic

ADDS UP TO-

GASO PUMPS
for every oil industry need

GASO PUMP & BURNER MFG. CO.

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Can your allowable *afford* downtime?

If you are accustomed to that gnawing feeling that comes from emergencies that arise when you're behind on production, Kobe *Free Pumping* holds a change for you.

No week-end is too long; no lease is too remote, and no weather is too fierce to prevent the changing of a *Free Pump,* when needed. One man, in a couple of hours, can put a well that is down back on production. With *Free Pumping,* you eliminate those long waits for equipment, pulling expense and rigging up and tearing down time. And you make the pumper independent of outside help.

So why keep those allowable worries when Kobe *Free Pumping* can resolve them for you. Why not call your nearest Kobe representative and let him tell you about the important investment and operating economies that come with the *Free Pumping* package.

KOBE, INC. *General Offices:* Huntington Park, Calif. *Division and District Offices:* Avenal, Bakersfield and Huntington Park, Calif.; Rangely, Colo.; Ardmore, Oklahoma City and Tulsa, Okla.; Brownfield, Corpus Christi, Fort Worth, Houston, Longview, Odessa and Wichita Falls, Texas; Brookhaven, Miss.; Hobbs, New Mexico; New York City.

Free Pump

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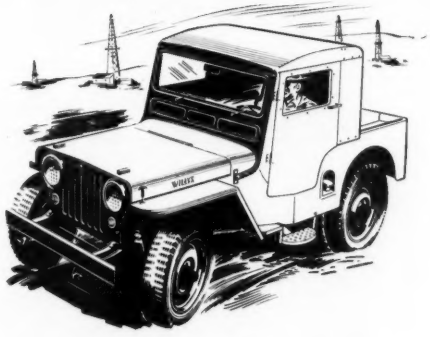
THESE ARE THE DAYS OF FREE PUMPING

The 'Jeep' Goes Through on All Four



In all kinds of weather, the Universal 'Jeep' goes through to wherever men and materials are needed. Selective 2-and 4-wheel-drive gives speed on the hard roads and ability to get over bad roads or travel cross-country.

Metal or fabric tops optional at extra cost.

Never before has there been such a vehicle—geared right to the needs of the oil industry—as the Universal 'Jeep'. It's rugged and tough, with plenty of what it takes to claw through the roughest oil country to get to the job.

Four-wheel-drive enables exploration crews to cross roadless territory and reach remote areas for survey work.

Drillers know the 'Jeep' as a tireless tool-pusher that gets emergency parts through when time means money.

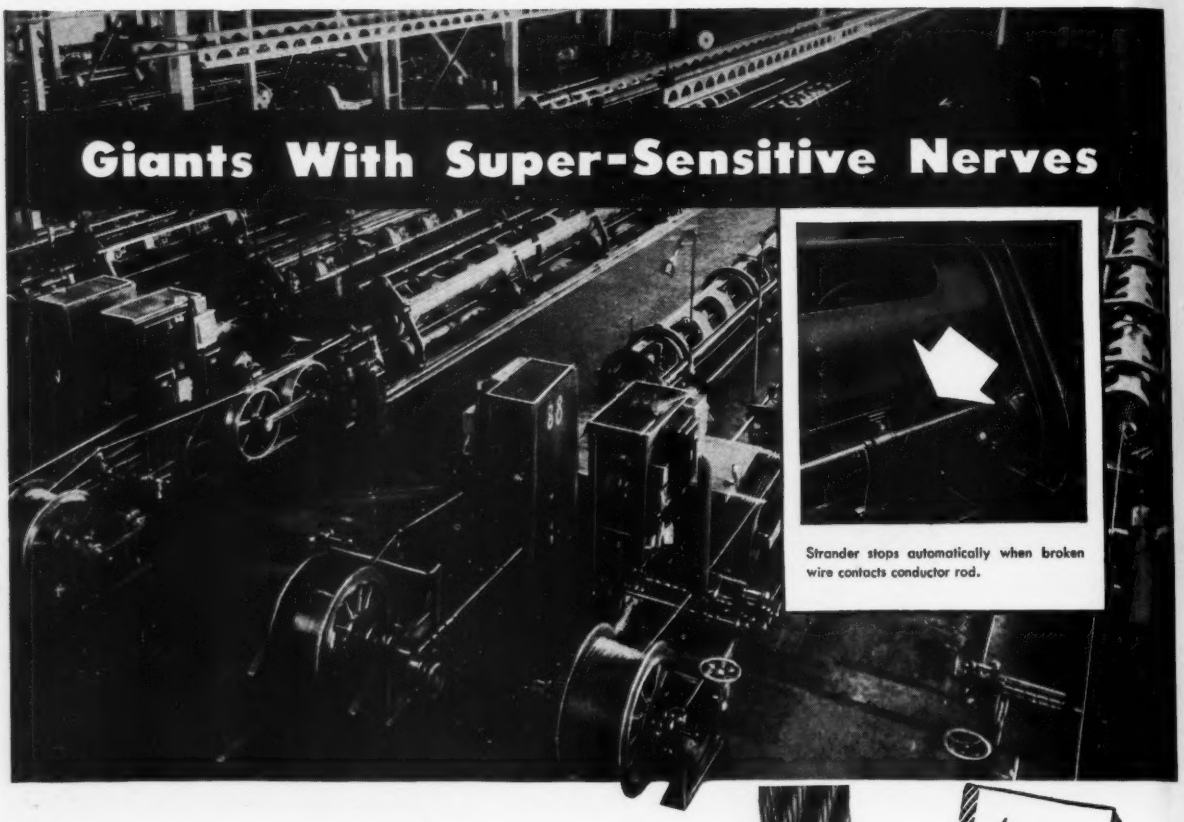
As a maintenance vehicle, the Universal 'Jeep' is proving its value throughout the oil industry. With power-take-off it runs generators, welders, power drills and many other kinds of equipment for on-the-spot repairs.

Consult your Willys-Overland dealer. Let him show how the 'Jeep' will save time and money in your operations.

4-WHEEL-DRIVE UNIVERSAL 'Jeep'

WILLYS-OVERLAND MOTORS • TOLEDO 1, OHIO • MAKERS OF AMERICA'S MOST USEFUL VEHICLES

Giants With Super-Sensitive Nerves



Strander stops automatically when broken wire contacts conductor rod.

Wickwire's modern rope machines (some of which twist as many as 46 wires into strand in a single operation) operate at tremendous speed. Yet, if a single wire breaks or if the wire in a spool runs out, the entire machine comes to a dead stop in less than six seconds.

When the sensitive automatic electric controls and air brakes have brought the strander to a stop, the wire ends are micro-welded by a skilled operator, who subsequently anneals the weld to restore its original toughness and ductility. Such thoroughness is your assurance of the uniformity and perfect construction, necessary if a rope is to deliver the utmost in performance, safety and long life.

Wickwire Distributors and Rope Engineers in key cities everywhere are ready to help solve your wire rope problems and to supply the type of rope that best meets your requirements. Wickwire Rope is available for prompt delivery from strategically located warehouse stocks and is supplied in all sizes and constructions, both regular lay and WISSCOLAY *Pre*formed.

HOW TO REDUCE ROPE COSTS AND PROLONG ROPE LIFE

Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write—Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Mass.

WICKWIRE ROPE

CF&I & SUBSIDIARIES

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

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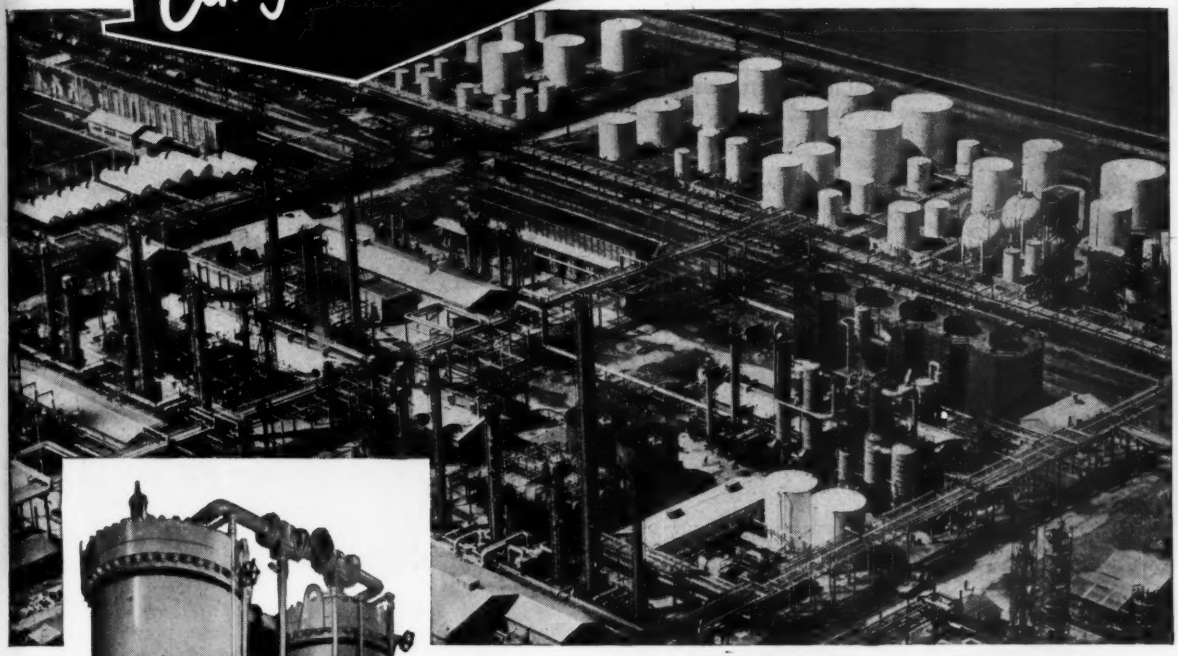
XUM

SHELL CHEMICAL'S SYNTHESIS OF GLYCERINE DEPENDS ON *Careful Control* OF REACTION CONDITIONS



BWC-3500
Lectrodryer

DRYing of materials employed in Shell Chemical Company's synthesis of glycerine is typical of the exacting controls maintained in these operations. Lectrodryers do that DRYing, removing moisture at a number of points in the process to uniformly low dewpoints.

C. F. Braun & Company who engineered this new plant at Houston, specified Lectrodryers for the drying operations.

You can similarly profit by calling on Lectrodryer for DRYing help—machines that have been time-proven ever since 1932, and engineering guidance gained in applying thousands of Lectrodryers in dozens of different industries. No need for your men to take valuable time designing and building special machines, when Lectrodryer service is so readily available.

Bulletin 105 describes the various types of Lectrodryers. For a copy, or for other DRYing help—air, gases and organic liquids—write Pittsburgh Lectrodryer Corporation, 325 32nd Street, Pittsburgh 30, Pennsylvania.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In Australia: Birlec, Limited, 51 Parramatta Road, Glebe, Sidney.

LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

LECTRODRYER

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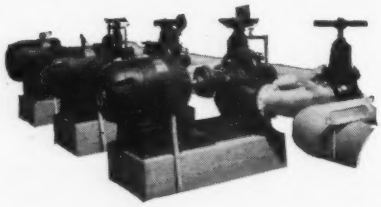
How do y

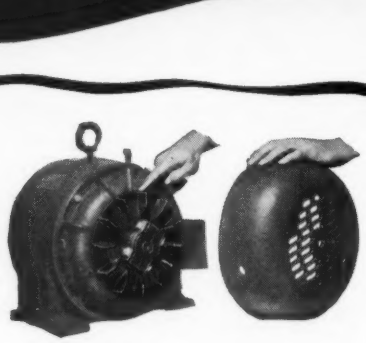
ON MOTORS



Q. As applied to a motor, what does "explosion-proof" actually mean?

1) *That the motor's operation is not affected by external nearby explosions?*
2) *That gastight construction prevents entry of gas or vapors that might explode inside the motor?*
3) *That the motor's enclosure withstands internal explosion and keeps sparks from escaping outside?*

A. An explosion-proof motor (Class I Group D) has an enclosure which will withstand an explosion of a specified gas or vapor which may occur within it, and prevent resulting sparks, flashes, or explosions from igniting the specified gas or vapor surrounding the motor. G-E makes the most complete line of motors tested and listed by UL for hazardous locations in refinery service—in some cases, the only ones so listed. See Bulletin GEA-4131.

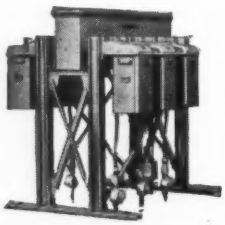


Q. What's the newest development in corrosion resistance for refinery motors?

1) *A newly developed paint immune to acids and alkalies?*
2) *A new type of cooling fan?*
3) *A special grease lubricant for ball-bearings?*

A. It's G-E's new Textolite® corrosion-resistant cooling fan, now supplied in all Tri-Clad® totally enclosed fan-cooled motors in ratings from 1 to 15 hp. Added to Tri-Clad's corrosion-resistant cast-iron enclosure, the new fan now makes these standard, off-the-shelf motors available for refinery service regardless of the acids and alkalies that may be encountered. It's nonsparking, too, and tested and listed by UL for use in explosion-proof motors for hazardous areas Class I Group D, and Class II Groups E, F, and G. Send for Bulletin GEA-4400 on Tri-Clad totally enclosed motors.

Q. If you were placing low-voltage control in a hazardous or semi-hazardous location, what equipment would you specify?



1) *Separate units and wall-mount?*
2) *Circuit breakers separate from starters?*
3) *A factory-assembled group unit?*

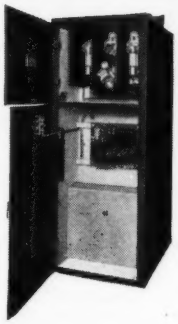
A. The convenient, time-saving way is to specify a racked-up assembly of G-E combination starters and breakers designed especially for indoor or outdoor refinery use. It's a standard, factory-built arrangement, with all control units mounted on a self-supporting framework. Available are corrosion-resisting, oil-immersed, and air-break explosion-proof types, the last two for Class I, Group D locations. Bulletin GEA-3541 gives data on oil-immersed starters.

GENERAL ELECTRIC

you rate ?

Q. When you want to combine high-voltage motor control with short-circuit protection in a semi-hazardous area, what do you do?

1) *Order circuit breakers magnetic starters, and overload relays separately?*
2) *Specify group-assembled controllers as one unit?*
3) *Install magnetic starters and provide for short-circuit protection by means of separate safety switches?*



A. You would do best by specifying high-interrupting capacity G-E refinery-type Limitamp controllers, with sealed current limiting fuses which serve both as fuses and disconnect switches. Contactors are oil immersed or in explosion-proof cases. These compact units are completely wired ready to be quickly and inexpensively installed. They are furnished as single units or as a complete group of several units, including incoming oil-circuit breakers and transformer feeders. Check Bulletins GEA-4247 and GEA-3660.

Q. For what reason would you specify a motor control center?

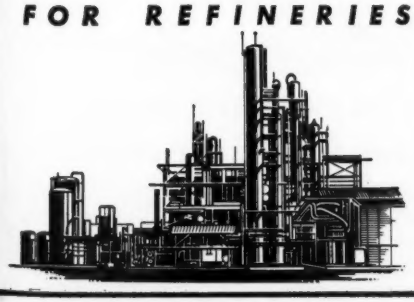
1) *It saves space?*
2) *It simplifies future expansion?*
3) *Easy installation and maintenance?*

A. All three features characterize the new G-E motor control center, with which you can plan the right combination for your plant's needs. Compact, self-enclosed starting units (in four size ranges, from NEMA size 1 to 4, inclusive) fit interchangeably within vertical sections. Front-connected wiring simplifies installation, changes and maintenance. Sections can be placed back to back or against a wall to utilize available plant space. Bulletin GEA-4979 describes the new G-E motor control center.

G.E. MAKES DOUBLY SURE YOU GET THE RIGHT ELECTRIC EQUIPMENT

Bring your questions on the selection of motors and control to General Electric. For G.E., over the years, has developed the most complete line of electric equipment to meet specialized refinery needs. What's more—to make doubly sure your selection is correct—G.E. teams up two or more engineers to advise you. Specialists who know their particular lines of electric equipment inside out work hand in hand with an "industry" man who is thoroughly at home with refinery practice and electrical needs. With their pooled knowledge and experience to draw on, you're certain to meet your requirements practically, economically. Check your nearest G-E office and help yourself to this "extra." For more information on motors and control, send in the coupon.

MOTORS AND CONTROL FOR REFINERIES



General Electric Company, Section C654-87
Apparatus Department, Schenectady 5, N. Y.

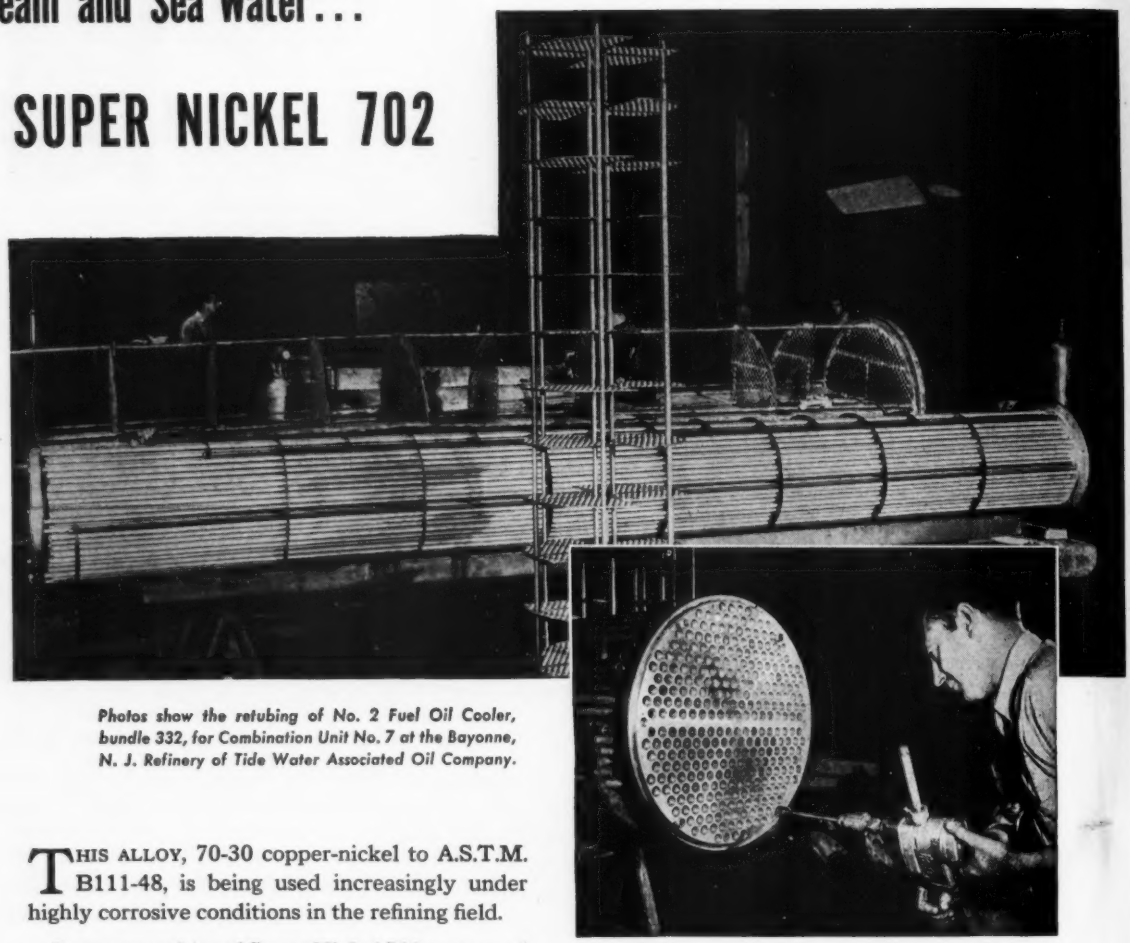
Please send me the following information on G-E motors and control for refineries.

.....*GEA-4131—Motors and control for hazardous locations*
.....*GEA-3541—Oil-immersed starters*
.....*GEA-4400—Tri-Clad totally enclosed fan-cooled motors*
.....*GEA-3660—Limitamp controllers with oil-immersed contactors*
.....*GEA-4247—Limitamp controllers with air-break contactors*
.....*GEA-4979—Motor control center*

Name.....
Company.....
Address.....
City.....State.....

For LONG-LIFE in contact with Petroleum, Tar, Gas Vapors, Steam and Sea Water...

SUPER NICKEL 702



Photos show the retubing of No. 2 Fuel Oil Cooler, bundle 332, for Combination Unit No. 7 at the Bayonne, N. J. Refinery of Tide Water Associated Oil Company.

THIS ALLOY, 70-30 copper-nickel to A.S.T.M. B111-48, is being used increasingly under highly corrosive conditions in the refining field.

Large quantities of Super Nickel 702 were used in 1947 and '48 for retubing heat exchangers cooled by salt water in the Bayonne, N. J. Refinery of the Tide Water Associated Oil Company.

Here, it was necessary to find a tube material that would resist not only the destructive forces commonly encountered in petroleum cracking and refining but withstand as well the action of a corrosive coolant, salt water from Bayonne harbor.

In determining the most suitable metal to meet your own heat exchange problems, the broad experience and metallurgical knowledge of our Technical Department is at your service. Anaconda Condenser and Heat Exchanger Tubes are available in eight standard and several special alloys, and are precisely controlled through every step of manufacture.

Anaconda Publication B-2, sent free on request, contains further information on tubes and plates for heat exchange applications. 48131—Rev.

ANACONDA
from mine to consumer

Anaconda

HEAT EXCHANGER TUBES

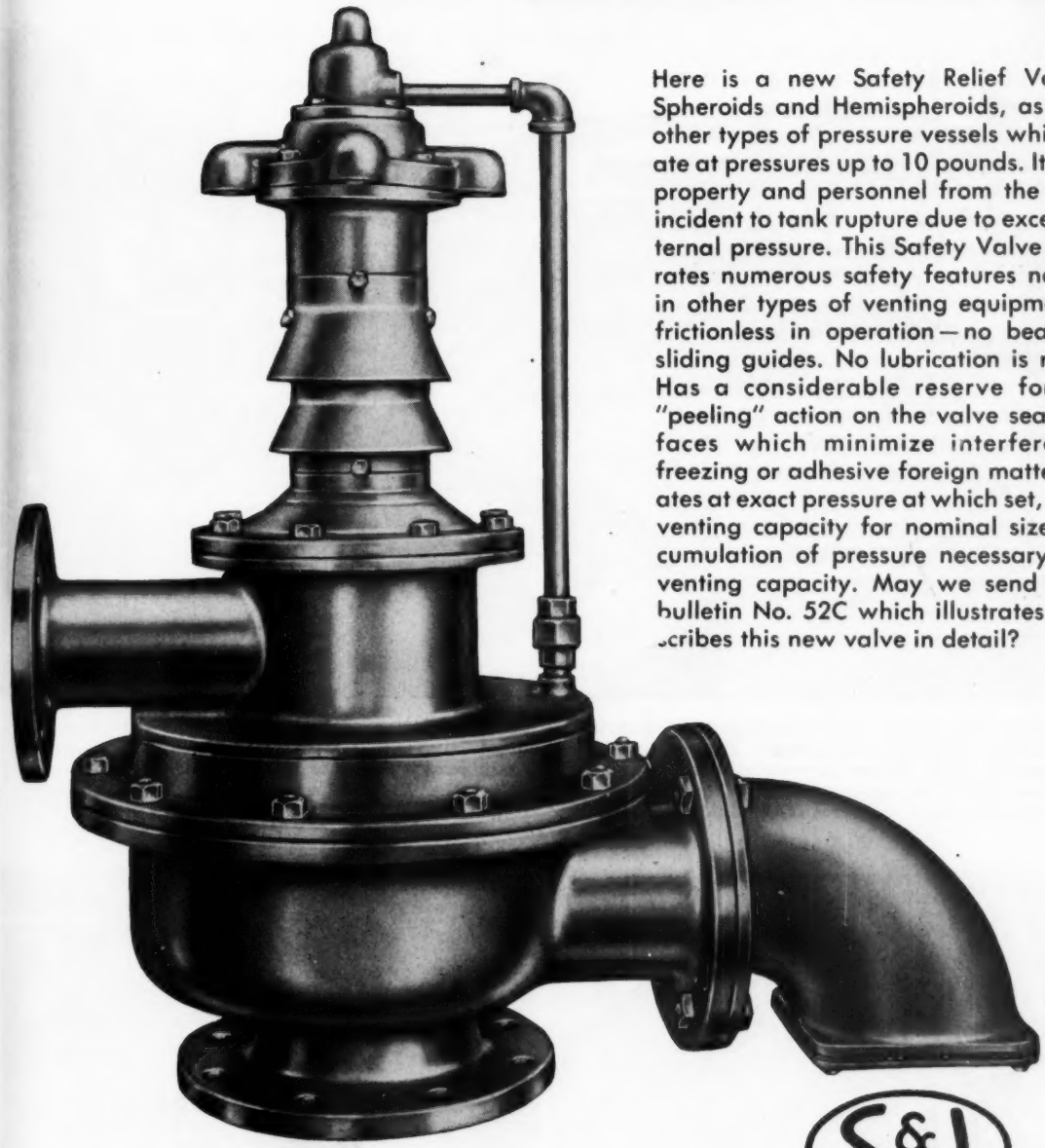
THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

New SAFETY RELIEF VALVE FOR PRESSURE VESSELS



Here is a new Safety Relief Valve for Spheroids and Hemispheroids, as well as other types of pressure vessels which operate at pressures up to 10 pounds. It protects property and personnel from the hazards incident to tank rupture due to excessive internal pressure. This Safety Valve incorporates numerous safety features not found in other types of venting equipment. It is frictionless in operation—no bearings or sliding guides. No lubrication is required. Has a considerable reserve force plus "peeling" action on the valve seating surfaces which minimize interference by freezing or adhesive foreign matter. Operates at exact pressure at which set, has high venting capacity for nominal size, no accumulation of pressure necessary for full venting capacity. May we send you our bulletin No. 52C which illustrates and describes this new valve in detail?

S&J

SHAND & JURS CO.
BERKELEY, CALIFORNIA

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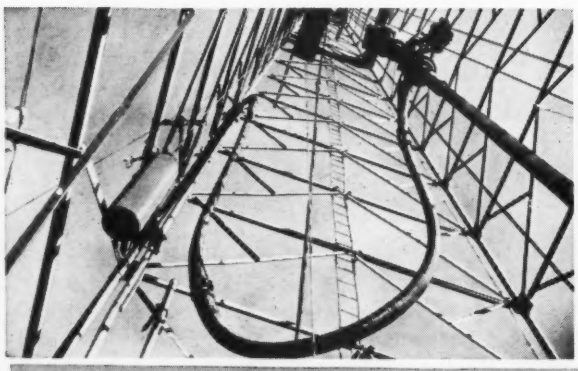
SHAND & JURS

WHEREVER petroleum men

Hewitt Oil Suction and Discharge Hose is faster-flowing, safer, more dependable. This smooth-bore hose is 10% lighter in weight than rough-bore hose and is far easier to handle. Its smooth, oil-resistant inner tube resists deteriorating effects of petroleum products and minimizes frictional drag. High-tensile wire reinforcement, imbedded in rubber, prevents expansion under pressure or collapse under suction. Special Hewitt curing process will not allow the tube to break loose.



At the derrick

Hewitt Rotary Drilling Hose cuts your operating costs. That's because it brings you the strength of steel and the flexibility of rubber. It is specially built for today's higher drilling pressures. It is tough enough to resist scouring drilling muds . . . yet it's flexible enough to stand constant bending.

At the refinery

Hewitt Tank Car Hose speeds your bulk movement of petroleum products. Its all-synthetic, oil-resistant tube and cover make it ideal to use where the inside and outside of your hose are in contact with gasoline or oil. Its smooth-bore tube assures you fast flow under pressure or suction.

need dependable hose . . .

they rely on Hewitt Hose engineered to meet their specialized needs

Whatever the job may be, you can always depend on Hewitt Hose to give you the utmost in performance.

You see, the complete line of special-purpose Hewitt Hose is *engineered and manufactured to meet your exact needs.*

Your investment in Hewitt Hose is safeguarded by the constant practice of:

Continuous research. It is no mere chance that Hewitt has brought you so many "firsts" in hose design and construction. It is the result of long and constant research by expert Hewitt technical men.

Careful testing. Hewitt engineers are always giving Hewitt Hose exhaustive tests to make sure that it measures up to your every need.

Field service. Trained engineers in the field help you select the *right* Hewitt Hose for your particular job. These men keep Hewitt informed of your changing needs, too.

HEWITT OFFERS THE OIL INDUSTRY A COMPLETE LINE OF SPECIAL HOSES

For drilling:

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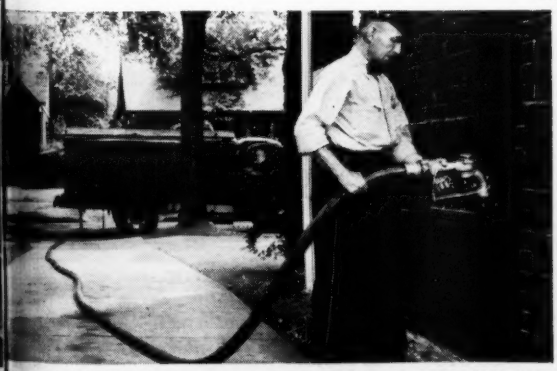

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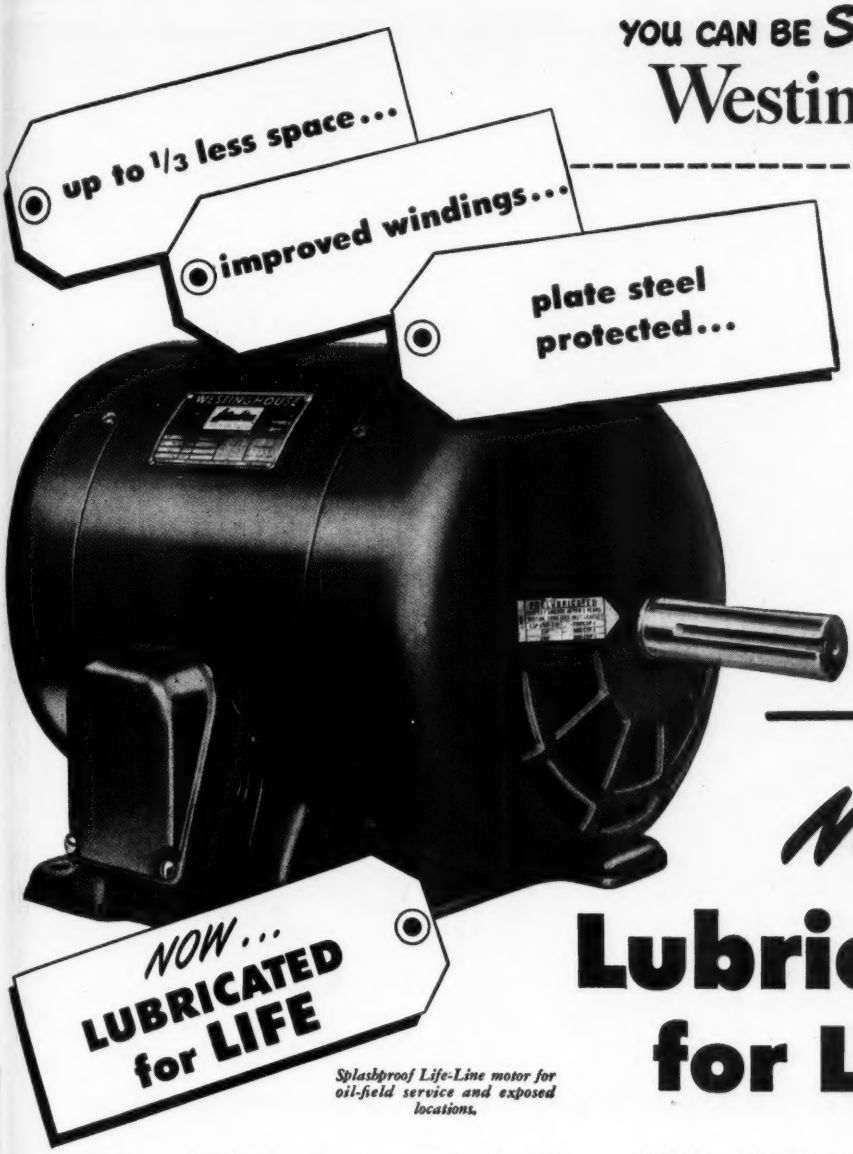

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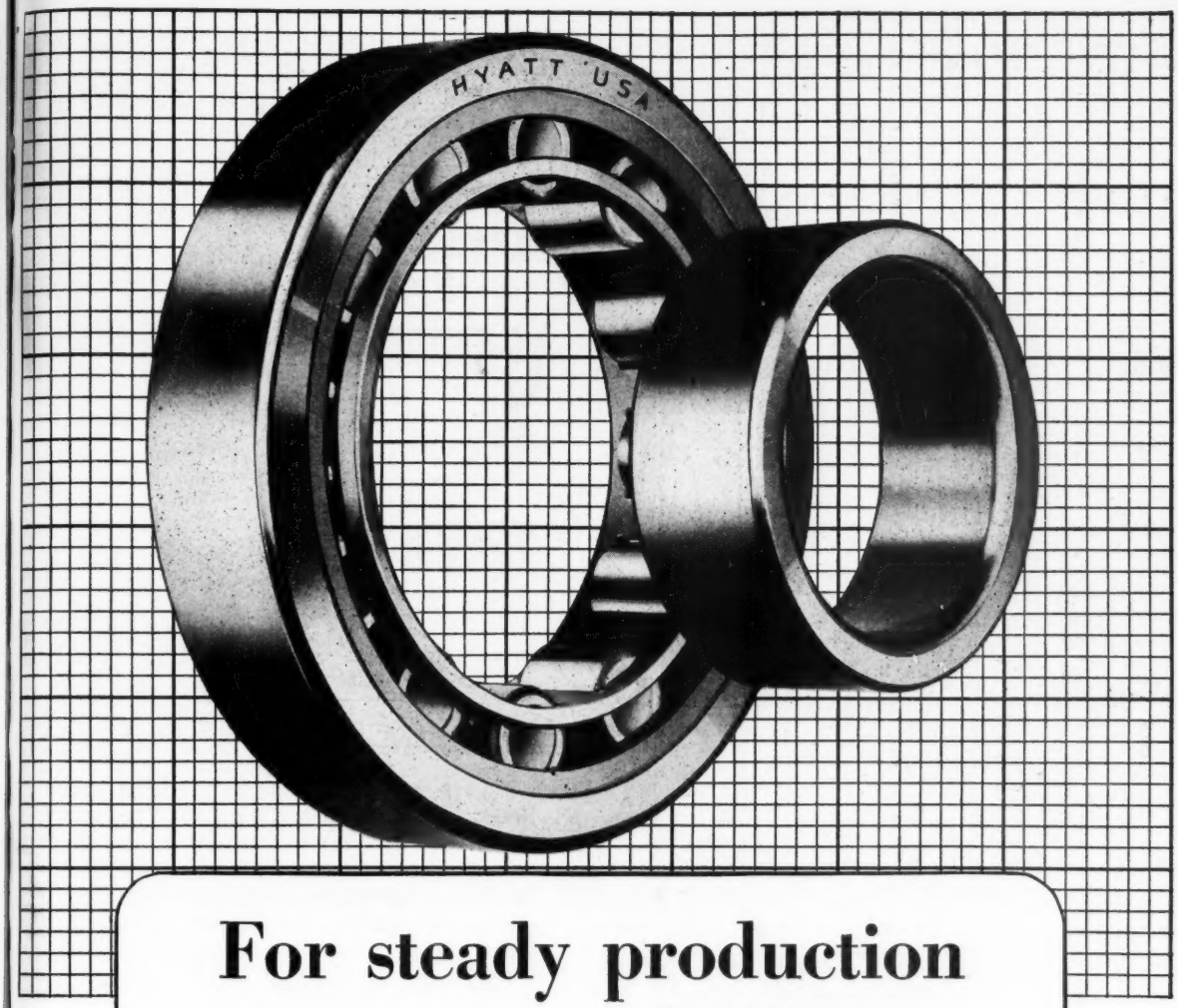

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JOURNALLY Speaking

Our Senior

OUR esteemed London contemporary, the Petroleum Times, achieved its fiftieth anniversary last month, remarking editorially "and thus has the longest record of uninterrupted service to the oil industry of any oil journal in the world."

Being only 47 years old ourselves we doff our hat to our venerable British cousin and wish it success for another half century. We won't dispute that claim to the longest record of uninterrupted service to the oil industry, but we would like to put in a mild plug for our parent, the Oil City Derrick, which started life as a sort of oil trade paper 30 years before the Petroleum Times was born, though in later years it has become a local daily newspaper.

One thing that intrigues us about the Petroleum Times' announcement is that while its fiftieth birthday actually was on February 18 it will not celebrate the occasion until June 17. This would seem to be a perfect example of the typical British propensity to do things in the convenient rather than the logical manner, such as always celebrating the king's birthday in June because the weather is so much nicer for lawn parties than on his actual natal day.

Live Dangerously

THE life expectancy of oil-well shooters and other handlers of nitroglycerin is commonly supposed to be relatively short, but one man who has successfully defied this belief is John J. Larkin, principal owner of Larkin Torpedo Co., Tulsa.

Larkin celebrated his eighty-seventh birthday on March 3, and simultaneously completed 70 consecutive years of shooting oil wells. He began the hazardous occupation back in Pennsylvania as a youth of 17 when the business was known as "moon lighting" because the shooters did most of their work at night to evade the agents of a company which claimed patent rights to the process, a circumstance which apparently added more glamor than danger. Still as active in his business as he was 20 years ago, Larkin probably gets a big laugh out of having outlived insurance men who shied away from him as a poor occupational risk.

Naval Threat

A FATE worse than federal control has been threatening offshore oil operations. Secretary Krug says that if the states don't stop their court and congressional actions which are delaying the federal Government's plan to take over the tidelands he will have the President order them "developed" as Naval oil reserves.

Under the bill Krug sent to Congress it would be possible to do some offshore drilling and producing under federal regulation, but the Navy's idea of "developing" an oil field, as it demonstrated at Elk Hills during the recent unpleasantness, seems to be to save the oil for the war after next. Naval strategists apparently consider the existence of oil in the ground the same sort of a weapon as what they call a "fleet in being," even though it never gets anywhere near the fighting line.

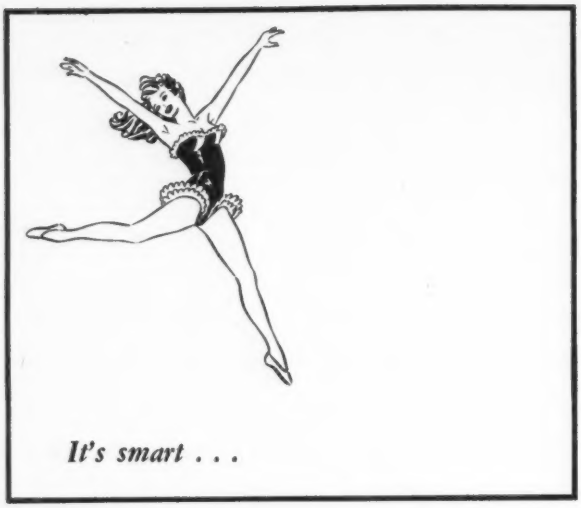
Reference Stuff

NEED any maps, reference manuals, reprints, or such material?

Our Readers' Service Department has quite an assortment, ranging from a 10-buck directory of refineries and refining personnel to a four-bit manual of fluid flow. Best seller is our pipe-line map, but there are a lot of other choice items in stock. A post card will get you the list.

Pillar of Erudition

VICTOR LAURISTON, our venerable Canadian correspondent, has had a school named after him in Chatham, Ont. This is an honor that seldom comes to one in the writing profession, and about the only way an oil man can manage it is to donate the building.



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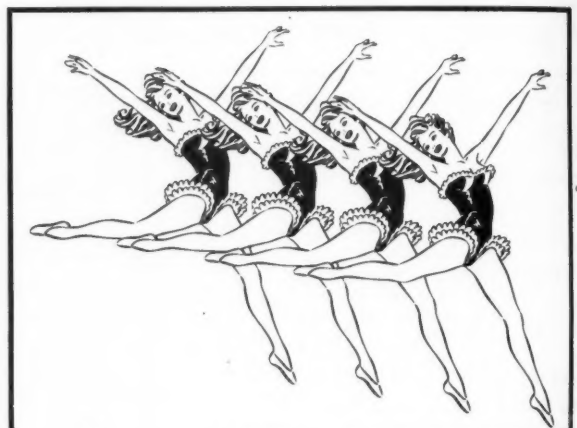

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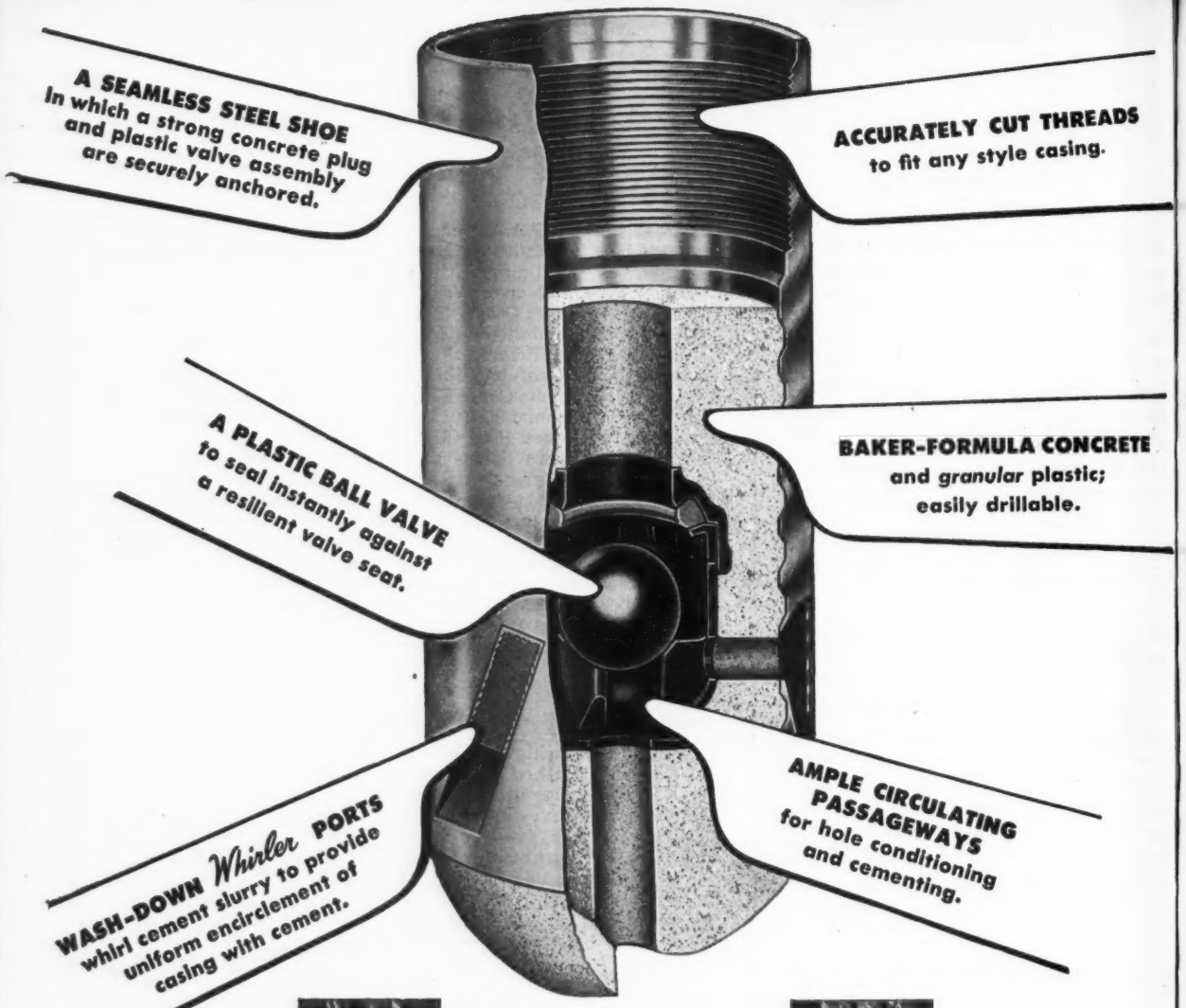
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Tax Season Open

WITH legislatures in session in many states, including the oil country, "open" season for new tax schemes to be paid by the petroleum industry and its customers is on. Taking their cue from the Washington administration the state spenders want more revenue and their only concern is to devise methods disguised so that the voter does not resent the additional burden.

Bills have been introduced, or will be, providing for substantial increases in taxes on crude oil or natural gas. Legislators in Texas and Oklahoma have resurrected old plans to tax processing operations within those states.

The thinking back of these proposals is that the tax will either be absorbed by the oil and gas industry or paid for by consumers outside the states. Thus the constituents of the lawmakers within the oil and gas states are to have all the benefits and none of the costs. Politically this has been described as "ideal tax".

As to taxes on crude oil and gas and the taxing of oil operations generally there can be no objection to reasonable rates. But any state which violates this basic principle will cripple the industry within its own borders. Furthermore, the excessive taxing of oil and gas by the states to be partially paid for by consumers everywhere is an open invitation for federal control, including the taxing authority. Oil and gas are national resources and state tax programs which place unwarranted burdens on consumers in the nonproducing states are certain to have unwanted reactions.

The processing taxes are wholly without merit. In Texas it is proposed to levy a 1-cent tax on all combustible fuels, with the resulting revenue permitting the dropping of the present 4-cent tax on gasoline. Thus Texas would benefit from a 3-cent reduction in its gasoline tax, with consumers of Texas products in this and other countries making up the difference. In Oklahoma the 1-cent processing tax would be in addition to present taxes.

Take the case of the Sooner state. In the middle twenties Oklahoma refineries accounted for about 10 per cent of the total refinery capacity in this country. Now the crude runs to stills are less than 5 per cent of the total. Had it not been for the advent of the product pipe lines, starting in 1930, present output would be largely confined to local needs. Oklahoma refiners must still sell about 75 per cent of their plant output to interstate customers in competition with the products of plants in other states. A 1-cent tax would end those sales. In fact the price disadvantage would be such that they would not be able to protect a large part of their intrastate market.

The same situation applies to Texas and any other oil state which considers such a law. The legislators of these states might better give consideration as to how through equitable taxing programs they could retain what processing they have—often their most important industrial enterprise—rather than forcing it to move to and expand in distant areas.

Hoffman Denies I.P.A.A. Charge That ECA Favors Foreign Oil

by Bertram F. Linz

WASHINGTON.—Provisions of the Economic Cooperation Act requiring the Economic Cooperation Administration to give preference to foreign oil in financing Marshall plan country purchases are not construed as prohibiting procurement of domestic oil "where such procurement will not conflict with the interests of the domestic economy," ECA Administrator Paul G. Hoffman told the House foreign affairs committee last week.

Responding to a request by committee chairman Sol Bloom of New York for a report on the testimony of L. Dan Jones, attorney for the Independent Petroleum Association of America, Hoffman denied allegations that these provisions were being used to the detriment of the domestic industry and that ECA's pricing policy had the effect of a subsidy to companies operating abroad.

Agreeing with Jones that there is no longer a world shortage of oil and neither crude nor refined products are currently in short supply in this country, Hoffman said the purpose of the preference section was to protect our petroleum reserves, but explained "this provision does not, in view of its history and purpose, prohibit procurement from domestic sources under conditions of temporary surplus where such procurement will not conflict with the interests of the domestic economy.

ECA May Buy Here

"Within these limits," he said, "ECA is free, as it should be, to finance procurement from any source at which these commodities may be available and is thus enabled to obtain the benefit of the operations of competitive forces upon the price of these materials.

"Any change in the existing law tending to establish a preferential status for domestic sources would not only increase the drain upon American reserves but would deprive foreign purchasers relying on ECA financing of the advantages of the lower prices at which such commodities might be available from sources outside the United States and would thus tend to defeat the objectives of the European Recovery Program by adding to the cost of these vital supplies," he added.

Hoffman told the committee, as he previously had explained to the Senate foreign relations committee, that Section 202 of the Foreign Aid Appropriation Act had not been used, as charged by Jones, to make the United States prevailing price the basis for the price paid for oil outside the United States, but to insure that no purchases should be made at prices in excess of those in this country, and his interpretation has been approved by the Comptroller General.

At the same time, he emphasized, ECA is not intended by the act to undertake "a price-control function involving the establishment of maximum prices based upon costs of production plus fair profits nor to engage in direct bargaining as a procurement agency."

Jones' recommendation that the section be amended to provide that "proper consideration" be given to the actual cost of production of commodities purchased abroad would add immeasurably to the burdens of administering the ERP and would "involve a departure from the policy of the Ecnomic Cooperation Act to facilitate and maximize the use of private channels of trade," Hoffman declared.

Explains Foreign Prices

"If, however, the present policy is to be abandoned and ECA required to give consideration to costs of production," he suggested, "then such requirement should apply to all commodities whether purchased in the United States or from foreign sources."

Further answering the charge that the domestic price had been made the standard for Middle East oil, Hoffman submitted figures showing that from 28 to 91 cents per barrel was saved on purchases last month on the basis of a comparison of the permissible price under Section 202 and the actual current price for oil, both f.o.b. Ras Tanura.

Hoffman also answered Jones' testimony that Middle East oil is coming into the United States at prices netting the Middle East exporters substantially less than the prices charged on sales of such oil to the Marshall plan countries, and sent the committee copies of correspondence between ECA and Gulf Oil Corp., Socony-Vacuum Oil Co., Standard Oil Co. (N.J.), and California-Texas Oil Co., in which he had outlined the administration's price position and asked for an explanation.

The responses of Socony-Vacuum and Standard had been submitted to the Senate committee *(The Oil and Gas Journal, March 3, p. 40)*, and Gulf's reply has been delayed because of the absence from Pittsburgh of S. A. Swensrud, but Hoffman added a letter from H. M. Herron, chairman of the board of Cal-Tex, stating that the Caltex group has not negotiated any crude sales to buyers in the United States since early last September, although some of its associated companies currently are making such sales.

As had the other company officials, Herron explained that the import situation is temporary and defended the prices of imports as based on commercial considerations of competitive market-price requirements.

"We believe that the policy of meeting competitive prices in the markets in which we sell enables us to exercise the maximum of competitive pressure consistent with our available production facilities and that this pressure for markets has the effect of giving lower prices to all buyers in the long run," Herron said.

Hoffman also submitted figures on our imports last year, which totaled 129,736,000 bbl., showing that 107,580,000 bbl. were secured from the Western Hemisphere and 22,156,000 bbl. from the Middle East. Middle East oil imports included 10,693,000 bbl. from Saudi Arabia, 7,430,000 from Kuwait, 3,377,000 from Iran, and 656,000 from Iraq.

Preference Not Asked

Commenting on Hoffman's report, Jones, in a letter to Bloom, denied he had requested that a preferential status be given domestic oil, explaining that all that was asked was removal of the present preferential status for foreign oil.

Jones also commented on Hoffman's statement regarding pricing, pointing out the I.P.A.A. is not concerned with the prices approved for ECA oil but with the fact that they in effect provide a subsidy for the Middle East companies which enables them to dump oil into the United States to the detriment of the domestic industry.

"Within the United States the domestic oil industry is highly competitive, with thousands of individuals openly and vigorously competing in all phases of the domestic petroleum industry," Jones explained. "Domestic prices, therefore, are established and controlled by the operation of the free-enterprise system and obviously there is no need or justification, as Mr. Hoffman assumes, for price control within the United States of maximum prices based on cost of production plus fair profits. Outside the United States, however, the world petroleum industry presents a different picture. This is revealed by the fact that all of the production in the Middle East is controlled by seven companies who have numerous interrelated operations. The pricing policy of Middle East oil is within the control of these few and is in no sense comparable with conditions in the United States."

Texas House Schedules Action on Two Oil and Gas Tax Measures

by Leigh S. McCaslin, Jr.

AUSTIN.—The Texas House of Representatives has set March 21 for actions on two highly controversial bills to increase taxes on the oil and gas industry within the state, one taxing natural gas to the extent of $42,000,000 annually and the other designed to raise $115,000,000 from processors of petroleum and natural gas.

On that date a subcommittee of the house will report on Rep. Deno A. Tufare's bill to levy a tax of 1.5 cents per 1,000 cu. ft. on natural gas. On the same day a committee hearing is scheduled for a bill by Rep. Davis Clifton repealing the state's 4-cent-a-gallon retail gasoline tax and substituting a 1-cent-a-gallon processing tax on all combustible fuels.

Unitization Compromise Talked

Other major activity in the Texas legislature this past week included an apparent compromise agreement on an important bill concerning unitization of oil and gas fields. Opposing factions appearing before the house oil, gas, and mining committee and indicated willingness to work out a compromise on the much-discussed Moffett-Miller bill. The senate oil and gas committee had previously approved the bill. Similar bills have been before the legislature several times in the past 10 years, but none has ever passed.

The Tufare tax bill was the subject of a 3-hour hearing last week before it went to subcommittee. Crux of the argument by the various witnesses during the hearing was: "Who is going to pay the bill?" Those in favor of the tax argued that the major portion would be paid by out-of-state people — those buying exported Texas gas. On the other hand, some of those against the bill contended that Texas gas producers and royalty owners, or perhaps Texas consumers, would contribute to the estimated $42,000,000 per year.

Witnesses for the bill were its author, Caso March, Baylor University law professor, and Dick Knight, manager of the Wichita Falls Chamber of Commerce. Upon being questioned, Tufare told the committee that his bill would cost the average home consumer around $4.17 a year if the bill is passed. March called the bill "one of the finest pieces of legislation for taxing natural resources ever introduced in the legislature."

In opposition to the gas bill, R. C. Kay of Amarillo, representing the Panhandle Producers and Royalty Owners Association, said: "Less than 10 per cent of this tax would be paid by exporters. The home folks would pay the other 90 per cent." Hayden Head, representing Celanese Corp. of America, which has a chemical plant at Bishop, Tex., said the tax would cost his company $100,000 additional per year. Warren Collins, Dallas attorney for Lone Star Gas Co., told the committee that the bill would raise $60,000,000 rather than $42,000,000 and that his company alone would have to pay $2,000,000 a year more.

The second important tax bill of immediate interest—the Clifton measure to tax the processing of combustible fuels—came in for a sharp blast of criticism during the week. Speaking in Odessa, Tex., before the Permian Basin chapter of the American Petroleum Institute, Andrew M. Howsley predicted such a bill would cause Texas refiners to lose their out-of-state markets. Howsley, who is general counsel for the Texas Mid-Continent Oil and Gas Association, added "this tax would cause a movement of the refining industry, now the state's largest manufacturing enterprise, into other states."

Clifton revised his bill slightly during the week. Under the revision, cities would be permitted to keep 5 per cent of the proposed gasoline taxes. Cities could spend their estimated share of $6,000,000 on building, maintaining, or policing streets.

Two new bills of interest to the oil and gas industry were introduced during the week. Sen. William T. Moore of Bryan was the author of both bills which pertain to the Railroad Commission's authority over natural gas. The first bill would allow the commission to limit the production of natural gas to "the reasonable market demand," In addition, the body would be required to consider conservation when setting up gas allowables.

The second Moore bill would allow the commission to fix the sales price of natural gas from a well if the operator and pipe-line officials cannot agree. Such price setting would be done after a formal hearing.

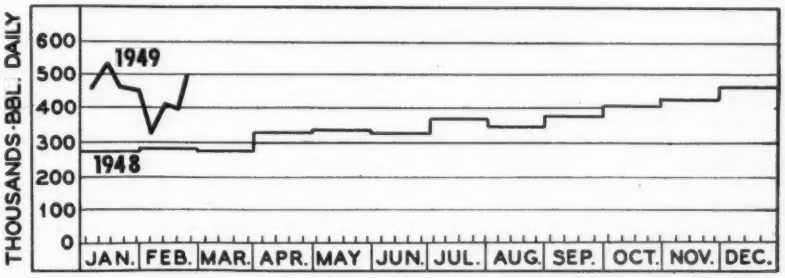
A debate in the house over an election bill brought in a mention of the Railroad Commission. Speaking in favor of the bill, Rep. S. J. Isaacks of El Paso said the commission members "should not be allowed the use of the peoples' time in running for what they consider better offices."

Journal Statistics Indicate Imports Of Crude Decreasing from 1948 High

CURRENT statistics seem to indicate that crude-oil imports have been decreasing for several weeks after reaching a peak near the end of last year. The accompanying chart pictures crude imports for 1948 on a Bureau of Mines basis and the Journal's estimates for the first 8 weeks of 1949.

The weekly estimates are based on reported refinery runs of foreign crude plus changes in stocks of imported crude. The average for a given month may vary slightly from actual imports because of split weeks at the ends of the month, but for a period of several months the totals should not vary more than 2 per cent from the actual.

The average for the first 4 weeks in January was about 20,000 bbl. per day above December but part of the big drop during the split week at the end of the month should be credited to January. The second 4-week period shows a decrease of about 75,000 bbl. daily from the average for the first 4 weeks and about 55,000 bbl. from the average for December. The high figure for the week ended February 26 was probably due to above-normal tanker receipts during the week and should be followed by a big decrease the next week.



Superior Well, Holder of World Depth Record, Drilling Ahead

LOS ANGELES.—Superior Oil Co. of California has broken its own previous world's depth record by approximately 700 ft. in its 1 Limoneira wildcat, 6 miles east of Ventura, Calif., and early this week was still drilling ahead below 18,500 ft. W. M. Keck, Jr., Superior vice president, is noncommittal on how much farther the well will be taken. "We'll be guided largely by what the geologists tell us," he said.

No oil showings have been encountered at present depth, according to a company statement. When the last cores were taken between 18,428-38 ft. the well was still in formation of Pliocene age and was "running low." The geologists feel, however, that the top of the Miocene may be encountered within the next 400 or 500 ft. and if this proves to be the case the well may taken into the Miocene as far as seems practicable.

The well has been drilled to its present depth in the remarkably fast time of exactly 6 months (to March 6, 1949) and the cost to date has been approximately $500,000, according to the company's own figures. This is in contrast to its former world's record holder, 51-11 Weller in Caddo County, Oklahoma, which took over a year to drill to 17,823 ft. and cost over a million dollars.

No Difficulties Met

Low cost of the Ventura County well has been due to comparatively easy digging and to the absence of serious mechanical trouble. There have been no difficult fishing jobs. Drill pipe stuck twice in January and once early this month, but was freed each time without much trouble. In all, there have been six minor fishing jobs. As an added precaution against trouble the bit is being raised off bottom about 50 ft. every half hour.

It can hardly be said that the well is being drilled by "veteran" crews, in spite of their skillful handling of drilling operations. Average age of the crew members is under 30 years, according to Keck. One of the drillers is only 25, has been working for Superior 2½ years and has been drilling for a year and a half. Superintendent in charge is Carl L. Corley, who was in charge of drilling the Caddo County, Oklahoma, record-breaker, and the drilling foreman is Melvin G. Uffen.

The well has been drilled with 500-lb. steam boilers driving a 15 by 16 500-psi. twin drilling engine. The drilling outfit is about 9 years old and was first placed in service in the San Joaquin Valley, California, where it has been used largely to drill 12,000 and 13,000-ft. wells in Rio Bravo and Greeley fields in Kern County. The 176-ft. steel derrick has a 32-ft. base and a rated capacity of 980,000 lb. Weight of the drill pipe on the hook at the present time is about 320,000 lb.

The well is considered a fine example of straight-hole drilling. The greatest deviation from vertical was about 3° at 9,087 ft. It has been under 2° most of the way down and at 16,660 ft. was only 1.5° off the vertical.

The electric logging device has been run down to 18,111 ft., in itself a world's record. Temperature at the bottom of the hole is about 280° F. As a basis of comparison, temperature at the bottom of Continental Oil Co.'s 15,004-ft well, a former world's record holder, drilled at Wasco, Kern County, California, in 1938, was about 300°.

Nineteen Cores Taken

To the time of writing, 19 cores have been taken with an average recovery of 53.4 per cent. Last core taken at 18,428-38 ft. was hard shale and siltstone. Structurally, the well is located on a syncline. From 2,620 ft. to 5,750 ft. the formation ran heavily to shale. From 5,750 ft. to present depth the formations have been largely interbedded sand and sandstone.

Aside from 1,979 ft. of 13⅜-in. surface casing, the only other pipe in the hole is a protection string of 9⅝-in., which is set at 11,209 ft. The hole is open blow that point.

Site of the well is on the Limoneira Ranch in the largest lemon grove in the world, which has, of course, been the cause of waggish comment. The lemon trees are valued at $5,000 an acre, and about 2 acres of trees had to be cleared away to provide adequate space for drilling operations.

Superior took members of the oil trade press to the well March 4 for a view of operations. Officials of the company present included W. M. Keck, Jr., executive vice president; John C. Cody, vice president in charge of production, Pacific Division; R. M. Allen, Jr., vice president; L. R. Rogers, chief petroleum engineer; and G. Y. Wheatley, resident petroleum geologist. Also present were members of the Ventura County board of supervisors and the Ventura Chamber of Commerce. Personnel of the crews now working on the well follows:

B. S. Perris, C. Nelson, C. Copeland, W. Brown, and K. Compton, drillers; H. Stepp, Guy Stacy, Leon Bowen, and Don Walker, derrickmen; Mac Donald, Steve Staley, C. Davis, Horton Harp, J. Evans, Andy Bateman, C. Craw, H. Huddleson, and Carl Pace, floormen; and E. A. O'Dowd, W. N. Blake, J. Gorman and M. Harris, firemen.

Indian Bureau Asks Osage Vote on Water Flooding

WASHINGTON. — The Bureau of Indian Affairs has authorized the Osage Indians to vote on a proposal submitted by the operating companies to unitize and water flood North Burbank field on their reservation in Oklahoma.

The field, discovered in November 1920, has produced something over 167,000,000 bbl. of oil, but recovery has declined to the point where it is advisable to undertake secondary-recovery operations.

If undertaken, the proposed operation would cover the largest area ever to be water flooded, 18,310 producing acres, and it is estimated it would result in the recovery of from 142,000,000 to 240,000,000 bbl. of additional oil.

There are 137 quarter-section oil leases in the field, 73 per cent of them held by Phillips Petroleum Co., Sinclair-Prairie Oil Co., and Gulf Oil Corp.

The companies' proposal provides for a change in royalties, now one-sixth on production up to 100 bbl. per well per day and one-fifth when the wells on a given lease average 100 bbl. per day during any calendar month. The new royalties would be one-sixth on the first 140,000 bbl. produced monthly until 20,000,000 bbl. have been produced, and one-eighth on the balance.

Taxes on Indian-Land Oil Upheld by Supreme Court

WASHINGTON.—Application of Oklahoma's gross production and excise taxes to oil produced by companies operating on Indian lands was held valid by the Supreme Court March 7 in a unanimous opinion.

The court, overturing previous decisions in similar cases, held that the fact that The Texas Co. and Magnolia Petroleum Corp., who were contesting the levies, operated under leases granted them by the federal Government implied no immunity from taxation and, while Congress could do so, it has never acted to create such immunity.

The suit was appealed to the court by the Oklahoma tax commission after the state courts held the tax did not apply to operations on the Indian lands on the ground that, in effect, it would be a tax on a federal agency. The state imposes two taxes, one of 5 per cent on gross production, the other of 1 mill per barrel produced.

this week

INTERNATIONAL—Three U. S. oil operators join in first big Mexican contract for development of upland and submerged areas. . . . Immediate objective will be development in Tabasco and Veracruz states. . . . ¶Two successful Arabian wildcats may open new producing fields. . . . ¶Pacific Western completes deal for oil concession in Saudi Arabia's undivided half interest in Nejd Neutral Zone. . . . ¶Philippine Government considering liberalization of present oil law to encourage foreign capital to enter the country for oil exploration. . . . ¶Two additional oil companies follow Creole in making substantial crude-oil production cutbacks. . . . ¶Figures show daily crude-oil production in Canada during 1948 averaged 60 per cent over 1947. . . .

TAXES—Legislatures in many states get flood of bills increasing taxes on oil and gas industry. . . . Both production and marketing affected. . . . ¶Two measures imposing heavy new taxes on producers are advanced in Texas Legislature. . . .

IMPORTS—Journal's statistics indicate imports of foreign crude may be on downward trend. . . . ¶I.P.A.A. still fighting purchases of foreign oil for European Recovery Program. . . . ECA administrator denies that foreign oil is favored or that prices paid Middle East producers depress domestic market. . . .

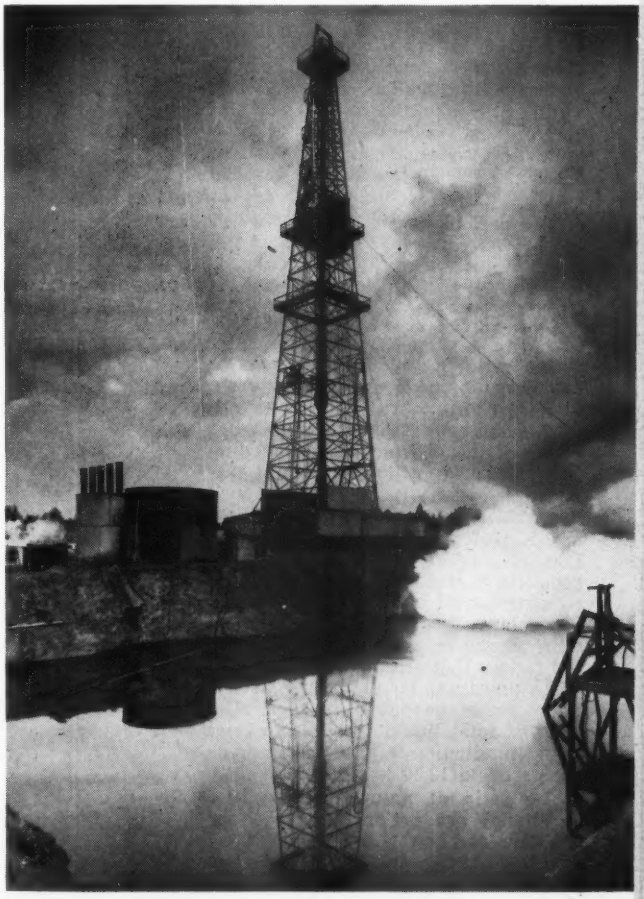
RESERVES—A.P.I. and A.G.A. committees complete annual survey of reserves. . . . Report increase in all types to new highs during 1948 despite record production. . . . ¶Reserves of crude oil and natural-gas liquids increased more than 8 per cent last year. . . . Reserves of natural gas rose 8 trillion cubic feet. . . .

REPORTS—Oil companies begin issuing annual statements. . . . Report high operations last year due to heavy expenditures for drilling and new facilities. . . . ¶Refinery and pipe-line construction may taper off but investments to increase output of crude and natural-gas liquids may increase. . . . ¶Most companies optimistic over prospects for continued high level of operations on more efficient basis. . . .

TRENDS—Reflecting reduced allowables, daily average crude production in U. S. for week ended March 5 decreased 151,350 bbl. to 5,179,800 bbl. . . . This is 179,670 bbl. less than same week last year and 451,500 bbl. less than average for last 8 weeks of 1948. . . . ¶Gasoline stocks on February 26 were 13,000,000 bbl. above last year with more than 50 per cent of the gain in Illinois-Indiana area. . . . Gasoline inventories were running 10,000,000 bbl. over previous year at end of October. . . . Stocks of four major products decreased 7,000,000 bbl. during 4 weeks ended February 26. . . . Continued reductions in products prices, particularly along the East Coast, characterized the market during the past week. . . . Declines in gasoline quotations were anticipated by some observers barring further reductions in runs to stills. . . .

TAPLINE—Many questions of policy and operation are being raised over the government deal to permit export of pipe in exchange for agreement of Trans-Arabian Pipe Line to move crude for Navy account. . . . I.P.A.A. suggests inquiry. . . .

PIPE LINES—Projects of El Paso Natural Gas and Pacific Gas & Electric for transmitting Permian basin gas from West Texas to Central California and San Francisco areas authorized by FPC. . . . ¶Proposal of Colorado-Wyoming Gas Co. to construct 41 miles of additional natural-gas line on its present system given FPC approval. . . . ¶Michigan-Wisconsin Pipe Line Co. project hearings scheduled before FPC March 14. . . . ¶Consolidated Edison seeks to construct natural-gas pipe-line facilities in New York City metropolitan area. . . .



World's deepest well, pictured here, described on opposite page, is Superior Oil Co.'s 1 Limoneira near Ventura, Calif. This week it was still drilling ahead below 18,500 ft.

A.P.I. and A.G.A. Committees Report Gain in Oil and Gas Proven Reserves

by Charles J. Deegan

THE petroleum industry broke all records for production in 1948, but at the same time it found enough new reserves during the year to bring the proven reserves of crude oil, natural gas, and natural-gas liquids to new all-time highs, according to the joint reports of the reserves committees of the American Petroleum Institute and American Gas Association.

Crude-oil reserves increased 8.34 per cent, or 1,792,759,000 bbl., to a new all-time high of 23,280,444,000 bbl. Reserves of natural-gas liquids increased 8.81 per cent to set a new record of 3,540,783,000 bbl., a barrel increase of 268,808,000. Natural-gas reserves increased almost 8 trillion cubic feet to a new record of 173.87 trillion cubic feet. These increases are summarized in Table 1.

TABLE 1—U. S. PROVEN RESERVES
(Millions of barrels—Trillions of cubic feet)

Crude oil, Jan. 1, 1949	23,280
Crude oil, Jan. 1, 1948	21,488
Increase	1,792
Natural-gas liquids, Jan. 1, 1949	3,541
Natural-gas liquids, Jan. 1, 1948	3,254
Increase	287
Total liquids increase	2,079
Natural gas, Jan. 1, 1949	173 87
Natural gas, Jan. 1, 1948	165.93
Increase	7.94

The ratio of crude-oil reserves to production increased slightly from 11.61 last year to 11.63 on January 1, 1949, despite an 8.21 per cent increase in withdrawals from reservoirs during 1948. The ratio of natural-gas-liquid reserves to production dropped from 20.24 last year to 19.27 on January 1, 1949. This minor drop in the face of a 14.28 per cent increase in production indicates that the rapid construction of new cycling and gasoline plants has not yet caught up with proven reserves. There are some indications that a proven reserve ratio of 15 times annual production would be a better economic balance. The ratio of total liquid reserves to total liquid production is 12.27 this year as compared to 12.30 last year.

The ratio of natural-gas reserves to annual production dropped very slightly and on January 1, 1949, stood at 28.94, compared to 29.47 last year. A 6.71 per cent increase in gas production was almost matched by a 4.79 per cent increase in reserves. The expansion of natural-gas lines has not yet reached a point of stability in all areas. Hence it is hard to say just what ratio will finally be established as a good economic balance.

Nine states accounted for practically all of the reserve increases in all three groups, crude, natural-gas liquids, and natural gas. The data on this are summarized in Table 2. Texas, as usual, dominated the picture, with almost exactly 40 per cent of the total increase in liquids, and slightly over 70 per cent of the total increase in natural-gas reserves. California showed a large increase in crude reserves and even managed to increase its natural-gas reserves. Oklahoma, in third place, showed a substantial increase in both crude reserves and natural-gas liquids, buit its gas reserves showed a slight drop, indicating that new discoveries failed to quite balance withdrawals. Kansas also showed a substantial increase in both crude oil and natural-gas liquids, but failed to hold its own

TABLE 2—STATES RESPONSIBLE FOR MAJOR PORTION OF PROVEN RESERVES INCREASE DURING 1948
(Liquids in millions of barrels—Gas in trillion cubic feet)

State—	Proven reserves increases during 1948— Natural gas	Total liquids	Crude oil	Nat. gas liquids
Texas	5.683	824	707	117
California	0.028	464	468	—4
Oklahoma	—0.018	343	298	45
Louisiana	0.496	139	78	61
Kansas	—0.149	125	112	13
Wyoming	0.902	63	36	27
Mississippi	0.052	61	62	—1
Illinois	0.007	44	38	6
New Mexico	—0.384	16	22	—6
Subtotal	6.617	2,079	1,821	258
All other states—net	1.325	1	—28	29
Total United States	7.942	2,080	1,793	287

TABLE 3—ESTIMATED PROVEN RESERVES OF LIQUID HYDROCARBONS IN THE UNITED STATES
(Thousands of barrels)

	Proven reserves as of 12-31-47 (1)	Extensions and revisions (2)	New discoveries (3)	Production during 1948 (4)	Proven reserves as of 12-31-48 (Cols. 1+2+3 less Col. 4) (5)	Changes in reserves during 1948 (Col. 5 less Col. 1) (6)
Alabama	2,759	1,264	.....	476	3,547	788
Arkansas	355.167	33.210	3,496	34.374	357.499	2,332
California	3,607.114	770.702	60,224	366.549	4,071,491	464.377
Colorado	389.824	28.089	887	17,043	401,757	11,933
Illinois	373.281	101.900	9,103	66.757	417.527	44.246
Indiana	46.080	5,963	5.129	7,985	49.187	3,107
Kansas	651.490	215.499	19.939	110.189	776,739	125,249
Kentucky	79.894	2.398	1,511	10,193	73.610	—6.284
Louisiana	2,253.818	268,934	67,474	196,840	2,393.386	139,568
Michigan	70.779	9,947	6,726	17,003	70.449	—330
Mississippi	362.336	92.683	14,376	46,385	423.010	60,674
Montana	116.022	15,098	1,550	9,726	122,944	6,922
Nebraska	866	235	.....	236	865	—1
New Mexico	616,405	55,261	12,425	51,613	632.478	16,073
New York	71,519	.....	.....	4,403	67.116	—4,403
Ohio	30.730	3.524	9	4,057	30 206	—524
Oklahoma	1,107.993	466,571	47,971	171,746	1,450.789	342,796
Pennsylvania	124.956	467	233	13,205	112.451	—12,505
Texas	13,734,600	1,630.314	187,008	993,030	14,558,892	824,292
West Virginia	53,613	4.276	459	6,437	51.911	—1,702
Wyoming	689,211	98,627	21,780	57,524	752,094	62,883
Miscellaneous	3,203	—362	864	426	3,279	76
Total U. S.	24,741,660	3,804,600	461,164	2,186,197	26,821,227	2,079,567

TABLE 4—ESTIMATED PROVEN RESERVES OF CRUDE OIL IN THE UNITED STATES
(Thousands of barrels)

	Proven reserves as of 12-31-47 (1)	Extensions and revisions (2)	New discoveries (3)	Production during 1948 (4)	Proven reserves as of 12-31-48 (Cols. 1+2+3 less Col. 4) (5)	Changes in reserves during 1948 (Col. 5 less Col. 1) (6)
Alabama	2,759	1,264	.....	476	3,547	788
Arkansas	296,908	29,990	3,247	30,103	300,042	3,134
California	3,294,963	750,614	58,075	340,069	3,763,583	468,620
Colorado	381,882	255	350	17,029	365,458	—16,424
Illinois	355,361	91,748	9,103	62,847	393,365	38,004
Indiana	46,015	5,892	5,129	7,957	49,079	3,064
Kansas	562,678	199,878	19,922	108,083	674,395	111,717
Kentucky	64,550	1,988	1,305	8,634	59,209	—5,341
Louisiana	1,791,004	201,728	51,361	174,803	1,869,290	78,286
Michigan	69,714	9,894	6,667	16,892	69,383	—331
Mississippi	303,677	91,962	13,434	43,627	365,446	61,769
Montana	114,662	12,258	1,550	9,526	118,944	4,282
Nebraska	866	235	.....	236	865	—1
New Mexico	530,483	61,017	8,083	47,352	552,231	21,748
New York	71,519	.....	.....	4,403	67,116	—4,403
Ohio	28,994	3,454	.....	3,906	28,542	—452
Oklahoma	952,990	412,886	39,746	155,221	1,250,401	297,411
Pennsylvania	122,720	.....	.....	12,914	109,806	—12,914
Texas	11,777,537	1,450,188	155,804	899,311	12,484,218	706,681
West Virginia	36,092	3,200	100	2,695	36,697	605
Wyoming	679,311	70,656	21,780	55,960	715,787	36,476
Miscellaneous	3,000	381	825	404	3,040	40
Total U. S.	21,487,685	3,398,726	396,481	2,002,448	23,280,444	1,792,759

TABLE 5—ESTIMATED PROVEN RECOVERABLE RESERVES OF NATURAL GAS IN THE UNITED STATES
(Millions of cubic feet—14.65 psia. at 60° F.)

	Reserves as of Dec. 31, 1947	Extensions and revisions	Disc. of new fields and new pools in old fields	Net change* in underground storage	Net production†	Total
Arkansas	890,149	73,969	3,484	—10	65,754	901,838
California	10,164,356	498,673	111,257	—2,699	578,994	10,192,593
Colorado	331,866	621,577	408,148	.....	12,412	1,349,179
Illinois	221,131	43,310	.....	.....	36,637	227,804
Indiana	13,000	14,104	.....	.....	5,504	21,600
Kansas	14,556,916	124,304	2,385	1,213	276,986	14,407,832
Kentucky	1,379,480	69,775	9,000	7,896	88,000	1,378,151
Louisiana	23,481,233	532,638	722,859	.....	759,210	23,977,520
Michigan	168,469	14,490	11,705	10,461	22,138	182,987
Mississippi	2,452,760	54,413	52,423	.....	55,260	2,504,336
Montana	700,510	189,244	1,966	1,575	40,690	852,605
New Mexico	5,990,283	—214,670	108,930	989	279,171	5,606,361
New York	64,900	4,098	.....	3,073	4,456	67,615
Ohio	611,200	57,780	7,880	13,325	60,732	629,453
Oklahoma	11,350,864	447,543	208,636	—283	674,315	11,332,445
Pennsylvania	483,063	182,967	12,000	13,972	74,592	617,410
Texas	90,025,566	6,563,060	1,830,349	.....	2,710,422	95,708,553
Utah	66,670	.....	10,000	.....	6,872	69,798
West Virginia	1,780,735	123,462	37,000	1,970	206,000	1,737,167
Wyoming	1,191,788	363,063	588,067	.....	49,178	2,093,740
Miscellaneous	1,975	5,683	3,000	.....	305	10,353
Total	165,926,914	9,769,483	4,129,089	51,482	6,007,628	173,869,340

*The net difference between gas stored in and gas withdrawn from underground storage reservoirs. †Net production equals gross withdrawals less gas injected into underground reservoirs; changes in underground storage are excluded.

on gas reserves. Louisiana showed a remarkably evenly balanced increase, crude up to 78 million barrels; natural-gas liquids up 61 million barrels, and gas up 0.496 trillion cubic feet. No other state increased its liquid reserves as much as 100 million barrels, but Wyoming had a big jump in gas reserves, almost a trillion increase, 0.902 trillion to be exact.

Ample Supplies Result in Ending of Allocation Plan

WASHINGTON. — The petroleum industry's voluntary allocation plan approved by the Government last August terminated February 28, and Walter S. Hallanan, chairman of the National Petroleum Council, liquidated the committees and subcommittees set up under the agreement.

Because of the present satisfactory supply situation, no effort was made to extend the agreement for another 6 months, as was possible under Public Law 395.

In telegrams to the chairmen of the five regional advisory committees set up under the plan, Hallanan expressed his appreciation of their services, and said "those who have participated in this plan for the alleviation of hardship situations at the consumer level resulting from possible insufficiency or disruption in the supply of petroleum products have performed an outstanding service to the public."

Krug Hints Naval Reserve Status for Tidelands

WASHINGTON.—The threat of government operation of the tidelands oil fields under the guise of naval petroleum reserves, should legislation providing for federal administration be long held up in Congress, was raised last week by Interior Secretary J. A. Krug.

Krug suggested the possibility of such action in discussing the achievements of the Interior Department over the past 100 years and outlining the objectives to be sought in its second century. The department was established March 3, 1849.

Krug's suggestion raised speculation regarding his purposes with respect to the tidelands and, questioned on that point, the secretary said he favored interim development through leases to private companies but that if the legislation which has been introduced, providing for federal administration, is long held up "consideration must be given to development as naval oil reserves."

President Could Act

Krug explained that the President could take action, apparently referring to the fact that lands have been set aside for various purposes by executive orders which require no consideration by Congress, and it would be necessary then only for the Navy to go to Congress to secure an appropriation for development of the lands so reserved.

There was no immediate reaction to Krug's suggestion from Congress, but industry spokesmen in Washington voiced their displeasure over any proposal to get the Government further in the oil industry. At the Capitol, Sen. Robert S. Kerr of Oklahoma, who is expected to take a prominent part in the consideration of any tidelands legislation which may come up, declined to comment, either on the proposal itself or a suggestion that oil interests concerned with tidelands development might seek a compromise which would make such action unnecessary.

There has been considerable talk of the possibilities of a compromise on the tidelands issue, although the state authorities concerned might not be parties to such an arrangement. It has been represented that the oil industry, which has no actual ownership of any of the submerged lands, is less concerned over whether the states or the federal Government shall own them than with the necessity for a flexible, quick-acting administration of the lands under which any problems that arise may be solved immediately, with equitable regulations for operation.

It is expected, however, that any actual effort to develop a compromise will be held in abeyance until the Supreme Court has acted.

Three U. S. Oil Operators Join In First Big Mexican Contract

WASHINGTON.—The first big-scale American oil operation in Mexico since foreign properties were expropriated in 1938 was announced this week in Mexico City and Washington.

A new organization, Mexican American Independent Co., is being formed by Samuel B. Mosher, president of Signal Oil & Gas Co.; Edwin W. Pauley, Los Angeles independent producer; and Ralph K. Davies, president of the American Independent Oil Co., to carry out a 25-year drilling contract negotiated with Petroleos Mexicanos.

The final signing of the contract apparently was responsible for the failure of Antonio J. Bermudez, director general of Pemex, to come to Washington last week, as scheduled, for discussions with Rep. William Crosser of Ohio, chairman of the House interstate commerce committee. Bermudez is in Washington this week to talk about a new approach to the problem of assisting Mexican oil development which Crosser said he has worked out.

Several Areas Covered

The agreement between the company and Pemex calls for development of both upland and submerged areas. the main immediate objective being the exploratory geological and geophysical work and development drilling in Tabasco and Veracruz states.

From Mexico City it was reported that the contract calls on Pemex to set aside the product of 50 per cent of the production from wells drilled by Mexican-American to compensate it for its expenses in developing producers. But the company will not be paid for dry holes. In addition, the company will be paid 15 per cent of the value of the production from its wells as profit and compensation for the risks assumed.

The entire operation will be in conformity with Mexican laws prohibiting the exploitation of oil resources by other than Mexican interests. Ths contractors' work will be supervised and controlled by Pemex during the drilling, and after a well is completed its control will pass to Pemex for exploitation.

A spokesman for Mexican American Co. explained that the contract authorizes the group to select nine structures in the State of Tabasco and one across the river in Veracruz, using their own geological and geophysical crews, in which to operate.

The exploratory and development period will run for 12 years, and in cases where drilling results in dry holes the American operators will have to stand the expense. Where oil is found, however, the company will be compensated for its costs out of 50 per cent of the production until it gets its investment back, and will be compensated for its work at the rate of 15 per cent of the production from upland areas, 16¼ per cent from lagoons, and 18¼ per cent from submerged lands over the 25-year period.

The company will be permitted to take its share of production in oil unless the oil is needed for the Mexican economy, in which event it will be paid off in dollars.

The company will be concerned only with exploratory and drilling operations, and once a successful well is brought in it will pass into the control of Pemex.

Selection of the structures to be developed in Tabasco will be left to the company, in agreement with Pemex, but the agreement calls for exploration of a structure in Veracruz which Pemex believes is promising. The spokesman for the company said the entire operation will be conducted in accordance with the program mapped out by Pemex for development of Mexican resources.

In a statement issued on behalf of the group it was declared that the way has been opened "for activities of profound importance to both the United States and Mexico," and pointed out that our national security, and that of the Western Hemisphere as a whole, depend upon the constant availability of abundant petroleum supplies, readily accessible when needed.

"Today's contract joins Mexican and United States technical skills and provides necessary additional private capital in the highly important job of developing Mexico's great petroleum resources," the statement said. "On the basis of conferences with Pemex officials over a period of several months, the contract is signed in full confidence that genuine progress will be made in the development of Mexico's petroleum resources."

The statement emphasized that the United States participants are joining only for the purpose of the Mexican operation and no merger of their other interests is involved.

Motor-Fuel Imports Exceed Production in Colombia

Imports continue to furnish an increasing part of motor-fuel needs in Colombia and last year for the first time imported gasoline exceeded domestic production of the product.

In 1948, domestic consumption of motor fuel in the country was 7,940 bbl. daily with 4,070 bbl. daily from imports and about 3,870 bbl. from domestic production. Domestic consumption was approximately 7,130 bbl. daily in 1947 but imports furnished 2,460 bbl. daily of the total and domestic production 4,670 bbl. daily. Only Colombian refinery of importance is Tropical Oil Co.'s 22,500-bbl. daily capacity plant at Barranca-Bermeja.

Pantepec-Creole Revising Concessions in Venezuela

Pantepec Oil Co., C.A., and Creole Petroleum Corp. are reliably reported to be negotiating a complete revision of the agreement under which Creole is operating several Venezuelan concessions.

Pacific Western Gets Concession On Arabian Half of Neutral Zone

PACIFIC WESTERN OIL CORP. has closed its deal for an oil concession in Saudi Arabia's undivided half interest in the Nejd Neutral Zone. Details of the concession terms have not been announced officially, but it is understood they are substantially those which were reported during negotiation of the deal. *(The Oil and Gas Journal, February 10, page 44.)*

These terms call for a royalty of 55 cents per barrel, formation of an operating company in which King Ibn Saud will have a nonvoting stock interest of 25 per cent, a cash bonus of $9,500,000, and a guaranteed annual royalty of $1,000,000.

The Nejd Neutral Zone lies on the Persian Gulf between Saudi Arabia and Kuwait, and jurisdiction over it is divided between these governments. It is about 50 miles long and 45 miles wide and has an area of about 2,200 sq. miles, and lies between the tremendously productive Burghan field in Kuwait and proven areas in northern Saudi Arabia.

(A map of this area appears on page 48 of this issue.)

American Independent Oil Co. has a concession on the other undivided half interest under terms of an agreement recently negotiated with the sheik of Kuwait, but has not started operations. Presumably Pacific Western and American Independent will have to make a joint operating agreement, since their concessions have the same geographical limits.

In Santa Monica, Calif., J. Paul Getty, president of Pacific Western, said that geophysical operations will start immediately, with some equipment being sent by air, and that drilling may start within a month. It is understood that the concession terms require drilling within a year, and that when production reaches 75,000 bbl. daily the company may build a refinery in the area with a capacity of 12,000 bbl. daily and facilities for production of asphalt and aviation gasoline.

The Saudi Arabian Government is to receive a 20 per cent stock interest in the refinery, and the share of profit in both the refinery and the producing company is to be calculated before taxes. It is also understood that all royalty and other payments are to be made in United States currency, thus avoiding changes due to fluctuations in the price of gold, which is the basis for most oil payments in the Middle East.

Pacific Western's bid surprised many experienced Middle East oil men because it is considered to be very high even though the neutral zone is regarded as a particularly favorable area. The concession terms are considerably higher than any other concession in the region.

Two More Oil Companies Cut Back Crude Production in Venezuela

TWO other leading Venezuelan operators, Mene Grande Oil Co. and the Shell organization, are reported to have followed Creole Petroleum Corp. in making substantial cutbacks in production.

As with Creole, the action reflects the greatly improved world supply-demand relationship and also the fact that some 60 per cent of Venezuela's production is of the heavy fuel-oil type.

Details of the reductions made by Mene Grande and Shell in Venezuela were not available in New York. One unconfirmed report was that Shell had cut back some 66,000 bbl. daily in recent weeks.

Shell is the second largest producer in Venezuela, with a 1948 output estimated at 151,594,000 bbl. for the year (about 410,000 bbl. daily). Principal operating company is Venezuelan Oil Concessions, Ltd. Mene Grande (Gulf), the third largest operator, had a production in Venezuela in 1948 estimated at 79,500,000 bbl. (about 217,000 bbl. daily).

Much of Shell's Venezuelan production and products moves to Europe. The slump in the heavy-fuel market in Europe has not been as pronounced as in the United States, though stocks there have been rising and some price cuts made.

Another Venezuelan development of top interest was the action of the military junta, which took control of the government last November, in setting up an eight-man commission to study the country's oil policies.

It is reported this group will take up the issue of whether the government should resume granting concessions. It is to study the over-all situation for 3 months with a possible extension of another 3 months. The group, the National Commission of Mining and Petroleum Policy, is headed by the minister of fomento and includes the minister of finance and six others.

The Venezuelan Government is scheduled in the near future to issue the administrative regulations for the income tax law amendment which sets up a sliding scale of rates to carry out the government's policy of a 50 per cent participation in company profits. These regulations will show the deductions and other adjustments made in computing the tax.

International
WORLD-WIDE OIL DEVELOPMENTS

Canadian Production Rose 60 Per Cent During 1948

CRUDE production in Canada during 1948 averaged 33,792 bbl. daily, an increase of 12,616 bbl. or 60 per cent over the daily average for 1947, according to the Canadian Department of Trade and Commerce.

Daily average production in December amounted to 40,244 bbl. with 54 per cent of the total coming from Leduc and Redwater fields. Production at Leduc started in April 1947 and at Redwater in October 1948.

PRODUCTION OF CRUDE PETROLEUM IN CANADA
(Barrels daily)

Province and field—	Dec. 1948	Year 1947	Year 1948
Alberta:			
Turner Valley:			
Crude	11,296	13,760	12,100
Nat. gasoline	1,700	1,171	1,290
Taber	501	562	551
Vermilion	296	379	307
Wainwright	26	50	47
Conrad	466	555	498
Lloydminster	1,126	835	1,770
Princess	442	293	511
Leduc	21,326	996	12,725
Redwater	547	.....	101
Misc. fields	59	55	82
Total Alberta	37,785	18,656	29,982
New Brunswick	71	63	58
Ontario	526	357	481
Saskatchewan	1,525	1,465	2,315
Northwest Territories	337	635	956
Total Canada	40,244	21,176	33,792

Co-op Association Plans Purchase of European Plant

Negotiations are now being conducted by the International Cooperative Petroleum Association for the purchase of refining facilities in Europe, according to Lloyd R. Marchant, general manager of the association in New York.

Successful Arabian Wildcats May Open Two New Producing Fields

by Dahl M. Duff

SUCCESSFUL formation tests have shown new production in two widely separated wildcats of Arabian American Oil Co. in Saudi Arabia.

One of the wells—and from preliminary indications the most important—is located 120 miles south of Ain Dar field. It represents the greatest stepout thus far in Aramco's drilling program and gives rise to the possibility that additional production will be found in the series of folds extending north to Ain Dar.

The second wildcat is about 70 miles northwest of Dammam field. In a formation test it indicated about 1,000 bbl. daily from a lower sand than those producing elsewhere.

The well south of Ain Dar is the Haradh wildcat. Drilling, testing, and coring is continuing with total depth at last report below 6,500 ft. In a formation test in a zone believed to be the Arab D sand, production was indicated which would make it a good well by Abqaiq and Ain Dar standards. In Abqaiq at present, 45 wells are producing some 420,000 bbl. daily, an average per well of about 9,300 bbl. daily.

Ain Dar field itself was discovered only last summer. Three wells have been completed and are shut in since there is no pipe-line outlet. Ain Dar production is from about 6,900 ft. with gravity of the oil 32°.

Near Railroad Route

Of interest is the fact that the Haradh location is near the projected right-of-way of the railroad to be built from Dammam to Riyadh, the Saudi Arabian capital. Aramco is furnishing technical assistance for this government project, and it is expected the railroad will be of benefit, particularly in moving personnel. The railroad will extend south to the Haradh area, then west, since the more direct route is blocked by cliffs.

The other wildcat, located northwest of Dammam, is the Fathili well. It is now below 9,980 ft., and testing is continuing. The indicated 1,000-bbl daily production is low by Persian Gulf standards, but further information also is necessary here before the discovery can be completely evaluated.

The Fathili is located approximately 15 miles southwest of Abu Hadriya field which was discovered in 1940 as the second of the five present Saudi Arabian fields. Only one well has been drilled at Abu Hadriya since development work was concentrated in the more accessible fields. Pay depth of the Abu Hadriya well is about 10,000 ft. The Trans-Arabian 30-31-in. pipe line crosses near this area, and development of this field is anticipated.

Both the Fathili and the Haradh locations were on seismograph and structural drilling prospects. A number of other promising features remain to be drilled.

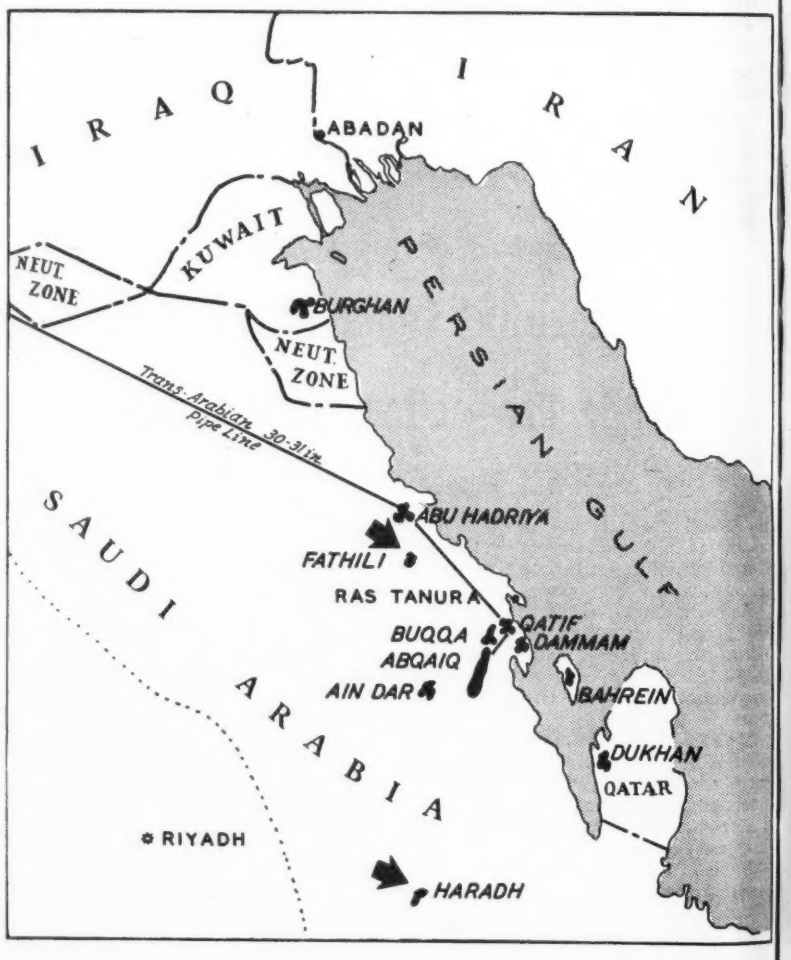
Aramco also is beginning an investigation of the submerged areas offshore in the Persian Gulf. One of the three structure drilling rigs now in operation on the concession is doing marine work. Marine geophysics, seismograph and gravity, is to be undertaken probably by summer.

Depending on the outcome of these studies, drilling on the underwater locations is possible next year. Initially this will be close in to shore with some of the work on islands and sand bars. A submerged drilling barge rather than a platform probably will be used.

Seven rigs are in operation on the Aramco concession, and the company contemplates continuous renovation work. Five of the rigs are employed in development work, one at Ain Dar, one at Qatif, and three at Abqaiq. The other two are on the wildcat locations.

Aramco has now done air and ground reconnaissance throughout its 440,000 sq. mile concession as well as the less extensive but more detailed geophysical studies. The program is for an orderly exploration expanding outward from the area of the existing fields. During 1948, geological and geophysical investigations consisted of two surface mapping parties, two gravity meter parties,

Arrows on map point to new Arabian discoveries



and one seismograph party in addition to the three structure drill parties. One survey party spent the 1948 field season in triangulation and leveling.

Abqaiq field continues by far the most important producing area on the concession. Of a production of about 523,000 bbl. daily in January, 420,000 was from Abqaiq, about 90,000 bbl. daily from Dammam, and 12,000 bbl. daily from Qatif.

The northern area of Abqaiq (Buqqa) formerly was considered to be separate, but additional drilling has indicated it is a part of the main field itself. This great field now extends some 30 miles north and south and includes 66,000 acres of proved territory. Of the more than 200 miles of Trans-Arabian pipe line completed thus far, 45 miles is between Abqaiq and Qatif, and this section is in service carrying Abqaiq crude to Qatif where it is moved through existing lines to the Ras Tanura refinery.

Additional drilling in Qatif field has indicated an increasing importance for this area. Six wells have been completed in Qatif, and the northern part has not yet been defined. This field was discovered in 1945 and produces from about 7,300 ft. The original Saudi Arabian field, Dammam, has been delimited and shown to contain about 9,000 acres. Thirty-three wells have been drilled in Dammam.

During 1948 production in Saudi Arabia totaled 142,852,989 bbl. (about 390.000 bbl. daily average), of which 105,902,423 bbl. came from Abqaiq, 33,426,992 bbl. from Dammam, and 3,523,574 bbl. from Qatif. New wells completed during the year were: 18 in Abqaiq, 2 in Ain Dar, and 4 in Qatif. At the end of 1948 a total of 99 wells had been drilled, of which 88 are capable of production.

Philippines Considering New Oil Law To Attract Capital for Exploration

THE Philippine Government is considering liberalization of its present oil law to encourage foreign capital to enter the country for oil exploration.

Demitro Andres, executive secretary of the Philippine oil commission, and Pascual Bautista, attorney with the Philippine bureau of mines, have been in the United States for some weeks conferring with oil officials on the subject.

The two reported that since the war a total of five wildcats have been drilled in the islands, which to date have produced no commercial oil. One of these holes was carried as deep as 9,000 ft., but no commercial production resulted. However, some shows of oil were encountered.

Total acreage under lease in the Philippines at the present time is only about 35,000 acres. Drilling so far has been chiefly on the island of Cebu, but tests are planned on other islands. The Philippine Oil Development Co., which is backed by national and United States capital, has drilled all the wells since the war.

Andres disclosed that geophysical exploration has shown a number of anticline prospects. Also, wells drilled to date have penetrated formations which resemble oil-producing formations in the United States and Sumatra.

The relative lack of interest in obtaining oil leases in the islands has caused the government some concern, which resulted in the current trip of Andres and Bautista. The two representatives have been to Europe and to various oil-producing areas in the United States, and their schedule calls for stops in Mexico before returning to their homeland.

Current demand for petroleum products in the islands is 30,000 to 35,000 bbl. daily. The country has a favorable dollar trade balance with the United States at present and would like to help insure that this condition continues by finding oil to satisfy its demands.

The present oil law of the country expires May 31, 1949, and Andres and Bautista hope to propose a new law to the Philippine Congress before that date. The Congress opened a 100-day session January 24. The Filipinos would not comment as to the probable tenor of their proposed bill. They planned to digest the many discussions of their world trip before reaching any decisions.

Andres did say that "the Philippine Government has no intention of conducting oil exploration or development on its own, preferring, rather, to continue its role of royalty and landowner with actual operations to be conducted by foreign capital."

There are between 30,000,000 and 40,000,000 acres of land in the Philippines with sedimentary rocks of sufficient thickness to arouse the interest of oil men. The acreage is primarily in the lowlands of the country which are well developed as to roads and supply points. In many places the lowlands extend to the sea at points where water transportation can be used for supply purposes.

Many seepages of oil are present in the islands providing encouragement for oil seekers. The Torrens Land Act has made the securing of land titles easy, as under this act the government guarantees land titles in any areas covered by a geodetic survey.

The relatively small amount of exploration to date is largely because the size of concessions and work requirements are too discouraging when it is considered that the Philippines are rank wildcat territory.

Two representatives of the Philippine Government get a look at Texas marine oil production in Matagorda Bay, south of Houston. Left to right, Paul Weaver, chief geophysicist, Gulf Oil Corp.; D. A. De Woody, seismic party manager, Gulf Research and Development Co.; Demetrio Andres, executive secretary of Philippine oil commission; and Pascual Bautista, attorney with the Philippine bureau of mines

Anglo-Iranian Negotiates Contract With Government

N. A. Gass, managing director of Anglo-Iranian Oil Co., Ltd., arrived in Teheran last week to resume discussions with the Iranian Government on revision of certain terms in the company's concession.

Navy's Interest in Tapline Oil Raises Questions on Its Intent

by Dahl M. Duff

NEW YORK.—The option obtained by the United States Government on capacity in the partly completed trans-Arabian pipe line relates only to movement of oil for the military establishments and makes no reference to cost of the oil itself, oil procurement, or disposition.

The agreement between the Government and Trans-Arabian Pipe Line Co. was announced last week in Washington by Charles Sawyer, Secretary of Commerce, at the same time that he approved resumption of steel pipe exports for the line's construction.

The company has agreed to transport at cost an amount of oil up to 5 per cent of the capacity of the line. The line's throughput is set at 296,000 bbl. daily, thus giving the military a call on up to about 14,600 bbl. daily of its capacity.

The option is for 10 years, and the per barrel cost figure refers to transportation only, including depreciation at 8⅓ per cent and interest. The option is not cumulative beyond quarterly periods, though it is suspended when the line is out of operation through no fault of the operators.

Trans-Arabian Pipe Line is owned by the four major companies holding the production in Saudi Arabia through Arabian American Oil Co. The companies are The Texas Co., Standard Oil Co. of California; Standard Oil Co. (N.J.), and Socony-Vacuum Oil Co., Inc.

U. S. Becomes Fifth Interest

The Government's newly acquired option will provide a fifth interest to share in the throughput. Ownership among the four companies is 30 per cent each expect for Socony-Vacuum with 10 per cent.

While the option is simply an agreement to move oil at cost, it leaves unanswered a number of other pertinent questions. The Navy's present purchases of Arabian oil are in the form of finished products. The agreement indicates crude oil will be obtained from the producing companies, and Sawyer said at his press conference that the Government anticipated no difficulty in the matter of oil procurement.

Yet to be settled apparently is the matter of refining the oil that will be moved through the line under the Government option. The 1,067-mile line will terminate at Sidon, Lebanon, and it is expected that one or more of the companies interested will build a large-size plant on the Mediterranean. Presumably the oil moved for the Government would be refined there with the price reflecting the cost-at-transportation agreement.

The Navy last June contracted to take 98,500,000 bbl. of oil products from the Persian Gulf area. The contract was with Caltex Oil Products Co. of California (Texaco and Standard of California). This represents some 54,000 bbl. daily.

At that time the Navy said the total cost involved was $182,850,000 and pointed out that there was a substantial saving, over and above the transportation aspect, from Gulf Coast prices.

Sawyer, discussing the option agreement, said the savings to the Government as a result of the deal to move the oil at cost would average more than $2,000,000 annually over the 10-year period. This presumably was figured on the basis of existing tanker costs around the Persian Gulf.

I.P.A.A. Wants Inquiry into Navy's Deal Involving Arabian Pipe Line

by Bertram F. Linz

WASHINGTON. — Announcement last month by Secretary of Commerce Charles Sawyer that exports of steel for the trans-Arabian pipe line would be resumed raised a number of questions to which, as yet, no satisfactory replies have been made.

Sawyer announced that the National Defense, Interior, and State departments and the Eeconomic Cooperation Administration had recommended last fall that shipments be resumed and indicated that his decision had been based, at least in part, upon acceptance by Arabian American Oil Co. of his proposal that it carry crude through its pipe line for the Navy at actual cost.

At the Navy Department, however, it was said that Sawyer had been advised that "the justification for the issuance of the export licenses for steel for the construction of the pipe line must be based primarily upon considerations other than military," and it was disclosed in other quarters that the Interior Department had not been consulted and knew nothing of Sawyer's decision until after it was announced.

In a report to Fred W. Shield, president of the Independent Petroleum Association of America, Russell B. Brown, general counsel of the organization, declared the development demonstrated that the Government "was committed by certain officials to a course of securing the position of the oil companies which held the Arabian concession."

Brown asserted that, despite agreement by officials that the Middle East fields and facilities could not be defended successfully, they are going ahead with actions which will endanger safety of the United States.

"If the Military Establishment has been given something—a stake in the project—that would constitute an obligation to back up the rights with arms," he said.

"A more threatening aspect of the government sponsorship of the Arabian development," he added, "is the fact that it contemplates a dependence by the United States on this area for much of its military supplies of petroleum. In the event of war with Russia, the entire development in the Middle East area would be of no more value to us than was the Canol project in the recent war."

Brown suggested a "properly instituted" inquiry to get the answers to questions which the granting of the export license raised:

Whether the agreement between the Navy and Aramco is formal or informal, and if the former what was in it;

Has the military establishment agreed to perform any service for the other parties to the agreement, such as protection and defense of the properties;

Is there any authority in law for a 10-year agreement, since normally authorizations for work to be done or programs to be carried on are on an annual basis;

Does the agreement, in effect, establish a property right for the United States Government in the pipe line;

Since the line is designed to transport crude and the military do not use crude oil, what further steps would be taken at the Mediterranean end of the line to convert the oil transported for the account of the military into usable products.

WASHINGTON WATCHING

BY BERTRAM F. LINZ

Interior Celebrates

WASHINGTON. — The Interior Department celebrated its 100th birthday March 3, and Secretary J. A. Krug announced the anniversary would touch off a year-long program to publicize its work.

The department's propaganda will be directed, among other things, toward "adoption of wise conservation measures to protect resources already available from premature exhaustion through waste and neglect" and "preservation of those sound American ideals written into our resource laws to assure spreading the benefits of federal resource development as widely as possible among the people."

But while oil men were studying his pronouncement to find the hidden meanings so often buried in official statements, the secretary had a word of encouragement for them.

"Contrary to the opinion of many people," he said, "conservation does not mean locking up our resources."

A lot of changes have occurred in government thinking since an economically minded Congress set up the Interior Department in 1849 under Secretary Thomas Ewing with a working force consisting of one assistant to take over from the Treasury Department the sale of public lands and relieve the State and War departments of a few "housekeeping" chores.

One hundred years ago the cost of government was approaching the $50,000,000 mark and there were murmurings of discontent. Today the cost of government is nearly 1,000 times greater, and the Interior Department alone, with some 50,000 employes, is seeking an appropriation of $667,000,000.

Critical State

RECOMMENDATIONS of the Hoover commission on government reorganization, critical of the State Department's employment of industrial specialists and an apparent lack of coordination with other departments in industrial fields, will be strongly resisted by department officials.

In a report to Congress, the commission recommended that the department discontinue the maintenance of industrial specialized groups which, it said, duplicate and sometimes interfere with the work of other agencies. On the other hand, it conceded, some of the other agencies want the department to consult them before formulating foreign policies or programs, while feeling free to initiate domestic policies or programs without consulting State officials.

These criticisms do not appear to apply to the department's petroleum division or the oil officials of other agencies, although it does hit directly at the recent fight between the departments of Agriculture and Commerce over exports of foodstuffs, to which State was a third party, and is probably true in a number of other instances.

Possibly because the big oil problems are dealt with by a handful of men from a few departments and agencies who have worked together for a long time, the cooperation in this field is pretty good. At the same time, there are only a half-dozen people in the State Department's petroleum division and they are kept so busy watching foreign oil developments that they have neither time nor inclination to involve themselves in domestic affairs.

Two plans of reorganization are under consideration in the State Department, neither of which calls for elimination of the petroleum division, and policy-making officials insist that the division is playing an important part in providing basic information which could not be secured through any other agency.

The Political Mind at Work

THERE is a lot more to the Senate's filibuster against the end of filibusters than meets the eye, and Washington is full of rumors, reports, and ideas that make a good story when they are put together. If half of what is being said is true, somebody in Washington stays up all night figuring "angles."

"They" say that since President Truman's program was fast losing momentum he thought it was a good time to go along with the plan to settle the filibuster question now, so he demanded a showdown which, if successful, would clear the way for his civil-rights legislation.

A considerable number of Republicans were willing to go along for various reasons, some sincerely believing in the civil-rights program, others just to help bust up the administration. But a number of friendly Republicans were alienated when Truman sent Agriculture Secretary Brannan up to the Capitol with his "economic strangulation" bill providing for government construction of production facilities.

But a lot of people believe that the President definitely defeated himself by his "crack" that a simple majority ought to be able to shut off debate. Even his own vice president, Alben Barkley, and his leader in the Senate, Scott Lucas, couldn't take that, and a lot of Republicans shied away pronto.

A "simple majority," as used by Truman, would mean that a bare majority of members present and voting could cut off debate; a Senate quorum is 49 and a majority would be 25—in other words, 25 members could run the Senate. Lucas was in favor of a "constitutional majority"—a majority of the full membership, or 49 votes. The Southern Senators are fighting against cloture by a two-thirds vote, the original proposal; depending upon attendance that might require anywhere up to 64 votes.

So, the President having expressed himself somewhat out of turn, it is more than possible that the effort to outlaw filibusters will fail, and that brings up another angle.

In his Jackson Day dinner address, Truman said his program was being fought by the "special interests" (popularly defined as everyone who doesn't agree with him) and if Congress failed to put through his program he might get on his iron horse and go barnstorming. His defeat on the filibuster issue might be the excuse he is waiting for.

They Come and Go

RESIGNATION of Defense Secretary James V. Forrestal is only one of a number of changes which President Truman is making in the leadership of the administration.

Since the November elections a number of second-string players—assistant secretaries of departments and the like—have submitted their resignations and returned to private life. In some instances these resignations have been suggested, either directly or by appointing others to higher jobs to which the men involved aspired.

Naturally, no difficulty is being encountered in securing men to fill the posts in which the President wishes to make a change. In fact, the only job that has gone begging is that of director of the Oil and Gas Division, which a number of well-known oil men have declined. Since that office has been vacant for several months and must be filled soon if much of the work of former director Max Ball is not to be undone, it is probable that a director will be picked in the near future from the staff of the OGD itself.

Weather Seen as Chief Cause of Drop in Demand for Oil Products

by John C. Casper

THE effect of weather on wintertime demand for petroleum products is indicated by total demand figures for December included in the Bureau of Mines Monthly Petroleum Statement. According to this report, total demand for all products averaged 6,626,000 bbl. daily in December 1948 compared with 6,673,000 bbl. daily in December 1947, a decrease of 0.7 per cent.

In general, weather was colder than normal during December 1947 and warmer than normal during December 1948. A comparison of demands for December and for the entire year will show the effect of the weather on fuel-oil consumption. Kerosine demand in December 1948 was 4.1 per cent less than in December 1947 while demand for the entire year was 9.1 per cent above that of the previous year. Distillate demand shows an increase of 1.9 per cent on the month-vs.-month comparison and a 13.7 per cent increase for the year.

Considering the increased demand for diesel fuels, the demand for furnace oils in December was probably slightly less than the year before. It is known that at least 10 per cent more homes were equipped with oil burners at the beginning of this heating season than at the start of the previous season. With the same general weather conditions that existed in December 1947, demands for furnace oils should have been at least 10 per cent higher than last year. Most operators expected this demand and increased distillate stocks to an all-time high.

Domestic demand for residual fuel was 1,526,000 bbl. daily in December or 9.4 per cent less than for the same period a year before, while the average for the year was only 3.7 per cent less than in 1947. The price cut early in the month was not enough to boost demand for heavy fuel and was followed by other reductions after the first of the year.

Domestic demand for liquefied gases is credited with the best percentage gain for the year, setting a new record in December with an average of 208,000 bbl. per day.

Current statistics indicate some improvement for the first 8 weeks of this year. Refinery demand (refinery production minus stock changes) is running about 3 per cent more than in the same period last year but most of the gain is for gasoline. Kerosine demand is running less than last year and distillate demand is up about 2 per cent.

Actual consumer demand for the current season is greater than that indicated by either the weekly or monthly data. Stock changes, from which demands are calculated, represent only the increases or decreases in inventories at refineries and primary terminals. No data are collected on the changes in distributors' and large consumers' stocks. On a rising market, these jobbers and consumers tend to increase their stocks, and on a declining market the reverse is true.

With the softening market during the past heating season, these purchasers have reduced their stocks as near as possible to minimum working levels leaving the products in primary storage where they are covered by A.P.I. and Bureau of Mines statistics. At least a part of the 106,000,000-bbl. increase in stocks last year was due to this shift from unreported to reported storage.

BUREAU OF MINES SUPPLY AND DEMAND—ALL OILS
(Thousands of barrels daily)

	December 1948	Per cent change from Dec. 1947	Year 1948	Per cent change from 1947
Crude production	5,688	+ 6.5	5,509	+ 8.3
Light products	435	+ 9.1	398	+ 9.3
Crude imports	469	+65.1	353	+32.2
Product imports	176	—11.0	160	— 5.5
Total new supply	6,768	+ 8.8	6,420	+ 9.0
Stock change	+142	.....	+291	.....
Total demand	6,626	— 0.7	6,129	+ 3.8
Crude exports	99	—32.1	109	—14.2
Product exports	248	+ 9.7	259	—20.0
Domestic demand	6,279	— 0.4	5,761	+ 5.7
Gasoline	2,328	+ 6.9	2,380	+ 9.3
Kerosine	399	— 4.1	307	+ 9.1
Distillate	1,330	+ 1.9	929	+13.7
Residual	1,526	— 9.4	1,368	— 3.7
Lube oils	96	—10.2	99	— 0.5
Liquefied gases	208	+13.7	176	+21.3
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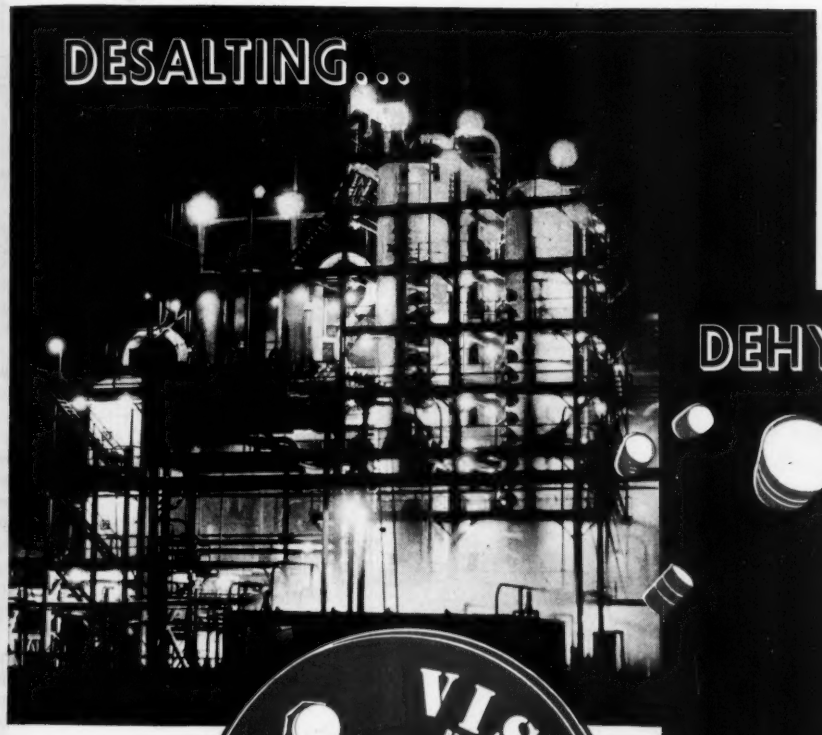

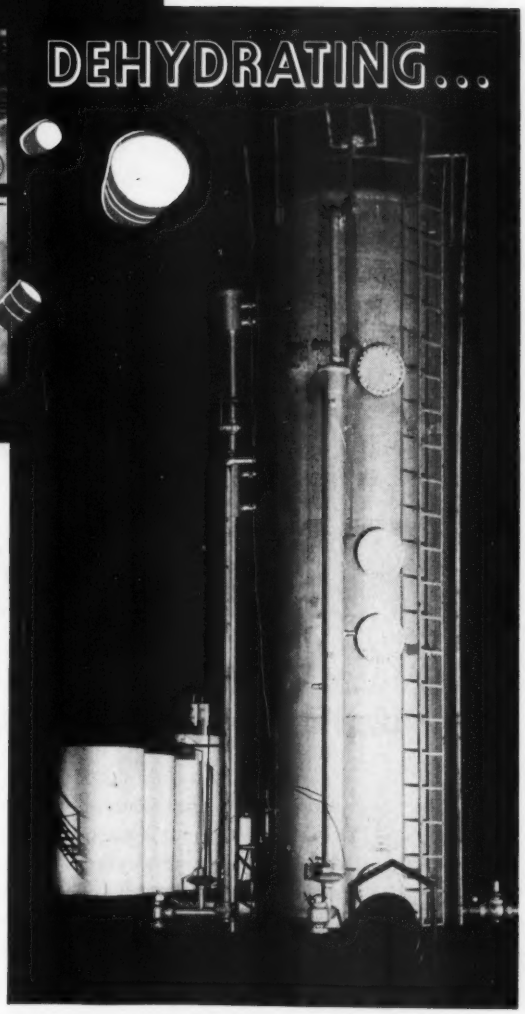

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INCORPORATED
City National Bank Building
Houston 1, Texas

Visco

DEHYDRATING AND DESALTING CHEMICALS • WHEREVER COST AND EFFICIENCY COUNT

NOTICE: Visco Products Company is authorized to manufacture and sell Visco Oil Treating compounds for use in the breaking and resolving of oil emulsions, and to grant licenses for such use, under the following United States patents: 1,860,562; 1,860,563; 1,912,330; 1,937,359; 2,050,639; 2,050,640; 2,206,589; 2,214,783; 2,214,784; 2,235,189; 2,303,414; 2,307,813; 2,318,034; 2,318,035; 2,321,066; 2,326,554. Re. 20,717 and patents pending. Any purchaser of Visco Oil Treating compounds is authorized to use the same in the treating, breaking and resolving of oil emulsions in accordance with the above patents. The royalty for such use is included in the purchase price. Visco Products Company is authorized to and is willing to grant licenses on a royalty basis, to all companies, and to others desiring to practice the patented subject matter, under any and all of the above patents, permitting the user to purchase the oil treating compounds at will from any vendor, and to prepare the compounds for use under the above patent or patents, at a royalty charge of 20 cents per gallon. Application for license should be made to **Visco Products Company**, Houston, Texas.

Weather Seen as Chief Cause of Drop in Demand for Oil Products

by John C. Casper

THE effect of weather on wintertime demand for petroleum products is indicated by total demand figures for December included in the Bureau of Mines Monthly Petroleum Statement. According to this report, total demand for all products averaged 6,626,000 bbl. daily in December 1948 compared with 6,673,000 bbl. daily in December 1947, a decrease of 0.7 per cent.

In general, weather was colder than normal during December 1947 and warmer than normal during December 1948. A comparison of demands for December and for the entire year will show the effect of the weather on fuel-oil consumption. Kerosine demand in December 1948 was 4.1 per cent less than in December 1947 while demand for the entire year was 9.1 per cent above that of the previous year. Distillate demand shows an increase of 1.9 per cent on the month-vs.-month comparison and a 13.7 per cent increase for the year.

Considering the increased demand for diesel fuels, the demand for furnace oils in December was probably slightly less than the year before. It is known that at least 10 per cent more homes were equipped with oil burners at the beginning of this heating season than at the start of the previous season. With the same general weather conditions that existed in December 1947, demands for furnace oils should have been at least 10 per cent higher than last year. Most operators expected this demand and increased distillate stocks to an all-time high.

Domestic demand for residual fuel was 1,526,000 bbl. daily in December or 9.4 per cent less than for the same period a year before, while the average for the year was only 3.7 per cent less than in 1947. The price cut early in the month was not enough to boost demand for heavy fuel and was followed by other reductions after the first of the year.

Domestic demand for liquefied gases is credited with the best percentage gain for the year, setting a new record in December with an average of 208,000 bbl. per day.

Current statistics indicate some improvement for the first 8 weeks of this year. Refinery demand (refinery production minus stock changes) is running about 3 per cent more than in the same period last year but most of the gain is for gasoline. Kerosine demand is running less than last year and distillate demand is up about 2 per cent.

Actual consumer demand for the current season is greater than that indicated by either the weekly or monthly data. Stock changes, from which demands are calculated, represent only the increases or decreases in inventories at refineries and primary terminals. No data are collected on the changes in distributors' and large consumers' stocks. On a rising market, these jobbers and consumers tend to increase their stocks, and on a declining market the reverse is true.

With the softening market during the past heating season, these purchasers have reduced their stocks as near as possible to minimum working levels leaving the products in primary storage where they are covered by A.P.I. and Bureau of Mines statistics. At least a part of the 106,000,000-bbl. increase in stocks last year was due to this shift from unreported to reported storage.

BUREAU OF MINES SUPPLY AND DEMAND—ALL OILS
(Thousands of barrels daily)

	December 1948	Per cent change from Dec. 1947	Year 1948	Per cent change from 1947
Crude production	5,688	+ 6.5	5,509	+ 8.3
Light products	435	+ 9.1	398	+ 9.3
Crude imports	469	+65.1	353	+32.2
Product imports	176	—11.0	160	— 5.5
Total new supply	6,768	+ 8.8	6,420	+ 9.0
Stock change	+142	.....	+291	.....
Total demand	6,626	— 0.7	6,129	+ 3.8
Crude exports	99	—32.1	109	—14.2
Product exports	248	+ 9.7	259	—20.0
Domestic demand	6,279	— 0.4	5,761	+ 5.7
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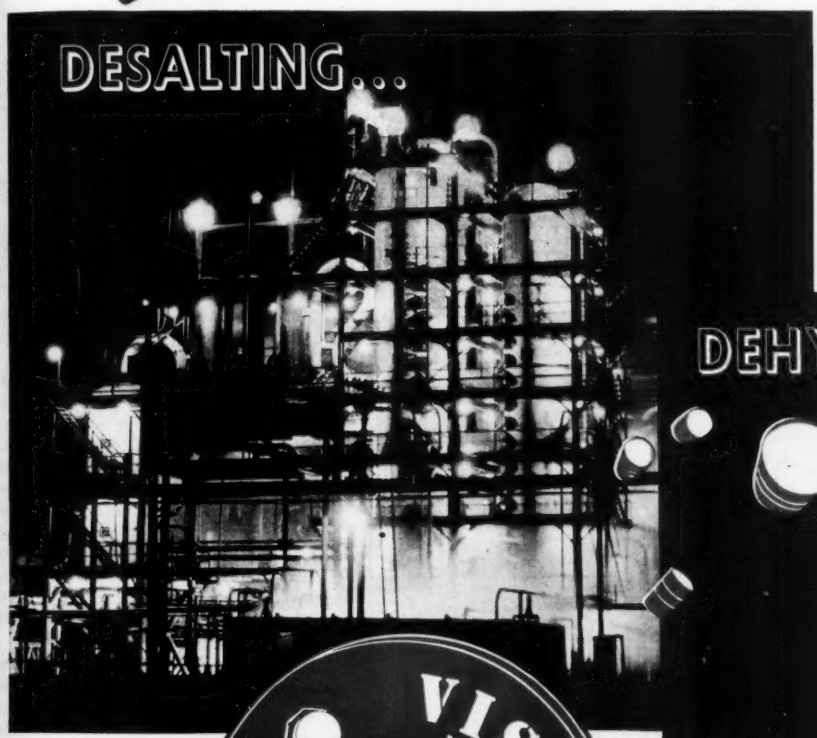

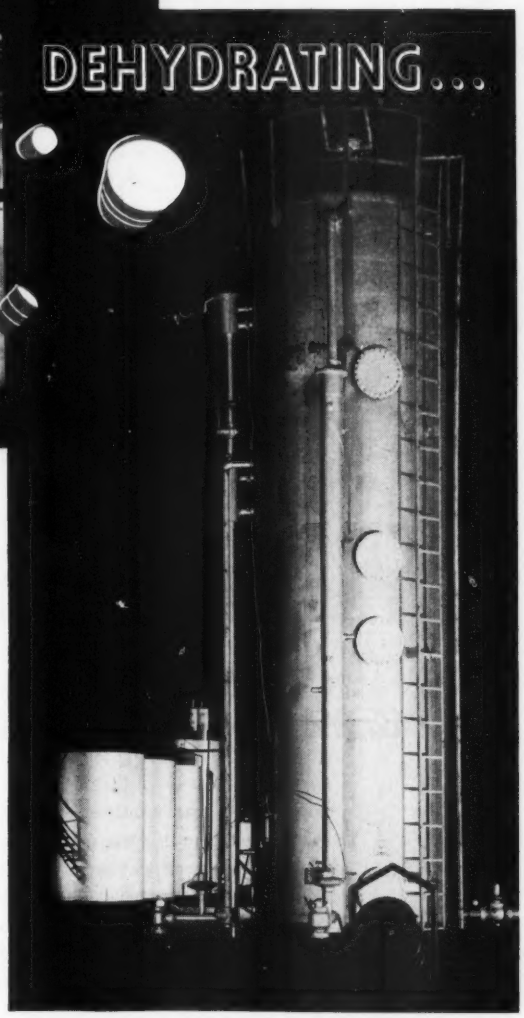

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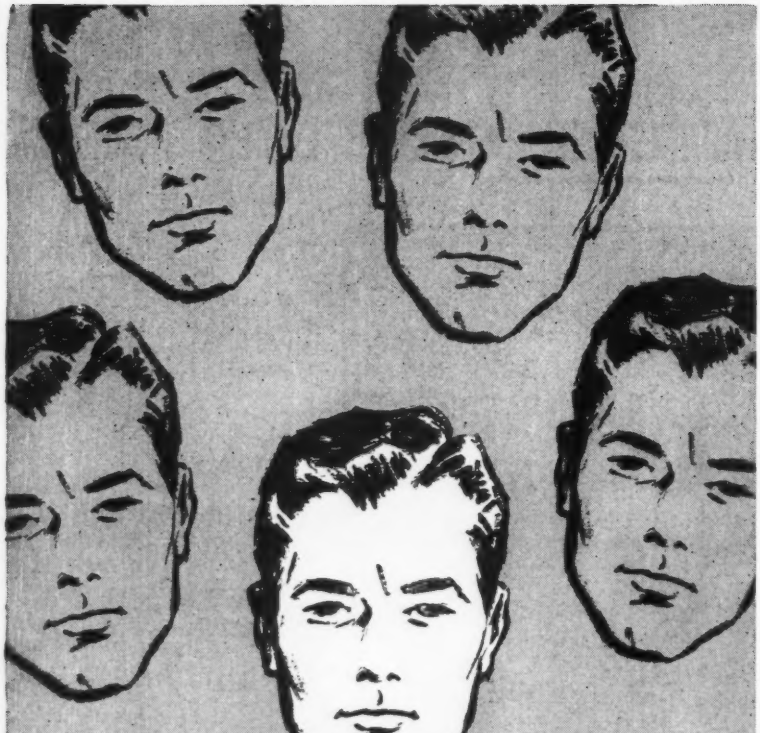

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• Chances are that you can handle today's problem with your own operating staff. And chances are that you can meet tomorrow's problem. But chance is no basis of operation for the refiner who values his product quality, his processing equipment and his production schedule.

UOP

Economy Keynote of Bay Refinery Expansion Plan

By C. O. Garbrecht
Vice President,
Bay Petroleum Corporation

The combined capacities of our three refineries at Denver, McPherson, Kan., and Chalmette, La., originally totaled somewhat under 14,000 b/d. Today, after completion of several projects in our program of expansion, total capacity has been increased to 22,000 b/d.

C. O. Garbrecht

These projects involved not only the installation of new facilities, but the revamping of obsolete equipment and the conversion of wartime units. All work was designed and executed with an eye to maximum economy, existing equipment and materials being utilized so far as possible.

The design and engineering of these improvements was handled by Universal Oil Products Co., whose engineers have a particularly thorough understanding of our problems because of their close cooperation with Bay during a period of more than 12 years.

Original Refinery at Denver

The story of Bay Petroleum Corp. began with the planning of the Denver refinery. At that time, UOP was called upon to design a thermal cracking unit. The refinery started operating in 1937 and the completed plant was rated at 2,900 barrels per stream day.

The McPherson refinery, with a capacity of 3,000 barrels, was acquired in 1937, and the Chalmette refinery, with 8,000 barrels, in 1944.

Changes at Denver

Expansion and modernization at Denver involved the following: Enlarging the capacity of the thermal cracking unit. Installing a reforming unit of 1,000 barrels capacity, which could be used alternately for crude distillation. Installing a catalytic polymerization plant. Installing LPG equipment.

Universal engineers determined that in order to increase the capacity of the cracking unit a larger reaction chamber would be required. This released the old reaction chamber for service elsewhere.

The design of the reforming unit, permitting its use in crude distillation, gives the refinery unusual flexibility. It is currently rated at 5,000 b/d.

There was an idle gas recovery plant which had been built during the war to fit the refinery into the nation's 100-octane gasoline program. This unit produced a liquid butane-butylene fraction from the cracked gases, to be transported to another refinery as feed for a hydrogen fluoride alkylation plant. Daily production of 90-100 barrels of alkylation

(Advertisement)

feed stock made this the smallest Defense Plant Corporation unit in the entire aviation gasoline program.

This gas recovery unit consisted essentially of two fractionating towers, a depropanizer and a debutanizer. These were adapted to similar service in a non-selective poly unit, while the old reaction chamber from the cracking unit served as catalyst chamber of the unit which was to produce 100 b/d of polymer gasoline.

Facilities were also installed to recover liquid petroleum gas from the effluent of the poly unit. This equipment consisted of a small packed deethanizer tower from which the ethane passes overhead to the fuel line. The ethane tower also removes water which is drawn from the receiver.

The bottoms, comprising poly gasoline, butane and propane, flow to the depropanizer from which dry LPG is taken overhead. High vapor pressure polymer from the bottom of the poly depropanizer is charged to the poly debutanizer which produces a 10 lb. RVP polymer.

The Chalmette Refinery

The Chalmette refinery, operating on crude from nearby fields, is the largest of our refineries, having a capacity of 11,000 b/d. Work here included modernization of an obsolete combination skimming and cracking unit and installation of a catalytic polymerization unit.

The combination unit, which had been in the refinery when we purchased it, consisted of a vis-breaking heater, a cracking heater, a flash chamber and a fractionating column.

UOP inspectors found the flash chamber unfit for further service and it was replaced. A reaction chamber, a stabilizer and an absorption tower also were installed. As operated now, crude is pumped through heat exchangers where it picks up heat from the vapors coming from the flash chamber, thence into the fractionating column, where the straight run gasoline is flashed off. The topped crude then goes to the cracking heaters.

The catalytic polymerization unit was built from plans which had been prepared in the latter days of the war for a unit to produce a feed stock for alkylation to make a component of aviation gasoline. The plans were modified to build a unit to produce 175 barrels per stream day of motor polymer.

The McPherson Refinery

In the McPherson plant, a combination skimming and cracking unit, similar to that at Chalmette, was converted to UOP two-coil operation, and a thermal reforming unit, also usable for crude distillation, was installed.

A codimer unit in this plant had been operated during the war to produce C_4 codimer as feed for a hydrogenation unit in another plant. This unit was converted to non-selective poly operation, designed to produce 100 b/d of motor polymer gasoline. LPG facilities like those at Denver, were installed.

The McPherson plant currently runs about 6,000 barrels per day.

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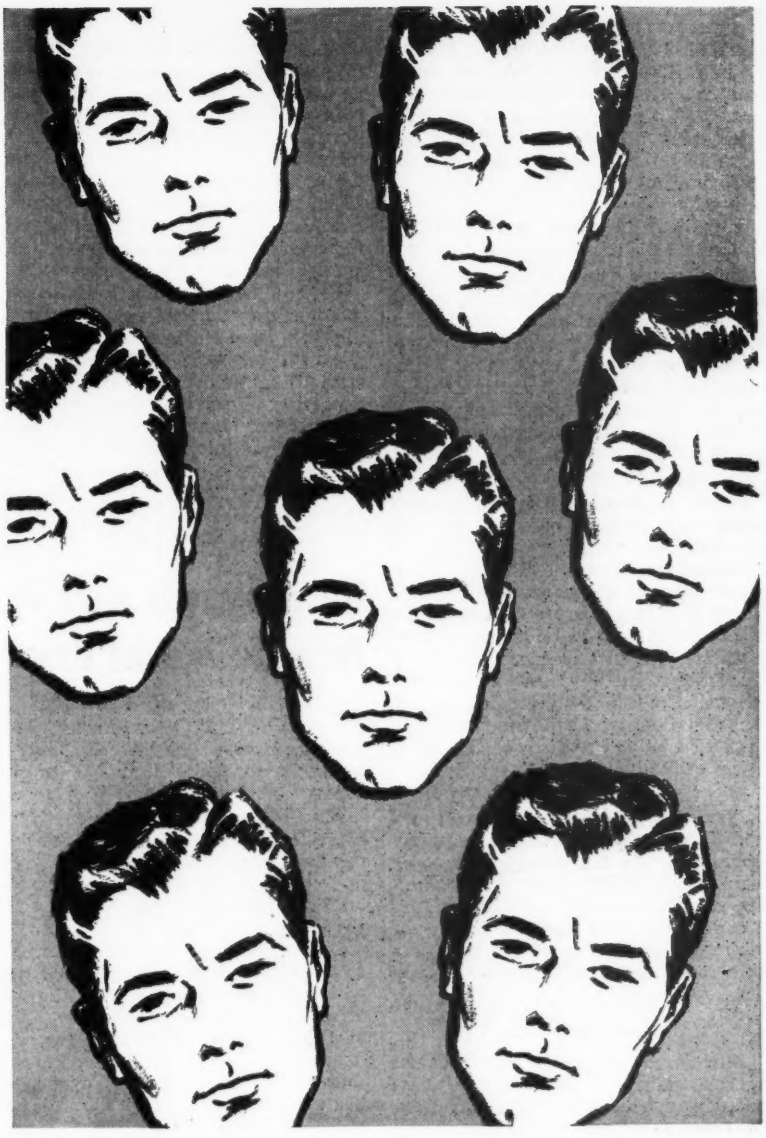

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Universal Service Protects Your Refinery

ing discovery by Barnsdall was Guijarral Hills, east of Coalinga in Fresno County, California, where the company has 1,440 acres under lease. The first well was completed in September, flowing 827 bbl. per day from the Leda sand, the first production from this sand in California. At the end of the year two other wells had been completed and three were drilling, and active drilling is planned for 1949.

Another important discovery was in Breton Sound, Louisiana, where Barnsdall has one-third interest in 63,360 acres. One gas well was completed and several prominent structures were located. To continue drilling in this area Barnsdall engineered a new type of submersible drilling barge which is now ready to drill additional test wells.

Other discoveries, some in cooperation with other companies, were a gas-distillate well on the Driscoll structure in Bienville Parish, Louisiana; oil and gas production on the North Gordon structure 2 miles south of Longville field in Louisiana; a gas-distillate well in a deep sand in Flour Bluff field, Nueces County, Texas; an extension to the Lawndale field in Los Angeles County, California; and the Sage Creek structure in the Big Horn Basin of Wyoming.

Most interesting feature of Barnsdall's development work was in Newhall-Potrero field in Los Angeles County, California, where nine wells were completed in the fifth producing zone at 9,000 ft., and one in the seventh zone at 14,500 ft. which established the existence of considerable reserves below zones previously developed.

Now in Canada

During the year Barnsdall began operations in Alberta Province, Canada, in cooperation with Honolulu Oil Corp. and Seaboard Oil Co. Three geophysical crews are at work and a well will be drilled soon at Little Bow River, southeast of Calgary.

The natural gas and natural gasoline departments of the company also expanded during 1948. Barnsdall's sales of natural gas totaled 23.6 billion cubic feet compared with 19.3 billion in 1947. Its gasoline plants produced 30.0 million gallons of liquid products compared with 23.6 million in 1947.

The Benton cycle plant in northern Louisiana, in which Barnsdall has 35.9 per cent interest, began operations in February 1948 with designed capacity to handle 50 million cubic feet of gas and produce 170,000 gal. of liquid products per day but at the end of the year it was handling 59 million cubic feet and yielding 207,000 gal. of products daily.

The West Tepetate gasoline plant in Louisiana, in which Barnsdall has 46 per cent interest, went into operation in July producing 27,000 gal. of products daily. Barnsdall's Avant and Earlsboro gasoline plants in Oklahoma were converted from naphtha to production of motor fuel, natural gasoline, and butane. Its absorption plant in Newhall-Petrero field of California commenced operations in October and is now processing 32 million cubic feet of gas and producing 40,000 gal. of products daily. Plans to build an absorption plant at Longville field, Louisiana, were indefinitely suspended because of high costs.

Barnsdall made a bid to enter production of synthetic fuels by proposing that the Government finance a plant to be operated in cooperation with Clinchfield Coal Corp. and Hydrocarbon Research, Inc., on 12,000 acres of coal lands owned by Clinchfield in Virginia, but no action has yet been taken on this proposal.

Barnsdall's net income per share in 1948 was $6.06, compared with $4.10 in 1947 and $2.30 in 1946.

Wilcox Reports Runs Up, Products Demand Down

REFINERY runs of Wilcox Oil Co. were 1,808,251 bbl. during 1948, compared with 1,656,474 bbl. in 1947, according to the company's annual report.

However, a decline in demand for fuels during the later part of the year reduced sales of refined products by approximately 50,000 bbl., and the total for 1948 was 1,636,081 bbl. compared with 1,591,008 bbl. in 1947.

During 1948 the company completed 43 wells (15 more than in 1947), of which 27 were wildcats and the rest offsets or close to production. Nine of these resulted in oil or gas, and one was gas only. In 30 per cent of these wells the company owned 100 per cent interest and in the other 70 per cent Wilcox owned between one-quarter and three-quarters interest.

The company is now moving rigs to its property near Elk City, Okla., where it owns two leases with 260 acres and a half interest in 520 royalties acres. A number of pay zones have been found there between 9,000 and 10,000 ft., and drill-stem tests have run from 46° gravity to distillate, the report declares.

Krug Backs I.P.A.A. Proposal For Oil Import Controls

WASHINGTON. — Demands of the Independent Petroleum Association of America for inclusion in reciprocal trade agreements of escape clauses which would adequately protect domestic oil producers against excessive imports were given support last week by Secretary of the Interior J. A. Krug.

Krug told a news conference that while imports are not a serious problem at the moment they raise a situation that must be watched very closely.

He told reporters he has a strong feeling that "our basic security rests on having a financially sound and economically healthy petroleum industry" and declared our import policy must be carefully scrutinized "to make certain that temporary fluctuations in imports do not undermine the financial security of the industry."

Krug suggested that the tariff agreements should be flexible enough to permit the protection of domestic industry.

"We can't let our basic industries fall apart financially because, during a short period of time, some foreign country should be in the position of flooding our markets," he said.

Krug declined, however, to say whether protection should be given by higher import tax rates, quotas, or a flat embargo on imports when potentially dangerous situations arise.

Texas House Votes Funds

HOUSTON.—The Texas House of Representatives has approved an appropriation of $100,000 for Attorney General Price Daniel to defend Texas' claim to the tidelands.

The measure, which now will go before the senate, was presented by Rep. William Jameson of El Paso.

Next Week

The Journal's Annual Exploration Issue.—This will contain reports, articles, and pertinent data of interest to those who have the responsibility of finding new petroleum in the United States and other countries.

Many leading authors will present special articles, such as Dr. E. A. Eckhardt of Gulf Research & Development Co.; Paul Weaver, president of American Association of Petroleum Geologists; L. L. Nettleton, president of the Society of Exploration Geophysicists; and Sumner T. Pike, member of U. S. Atomic Energy Commission. There also will be a large "Digest Section" of the A.A.P.G., S.E.G., and S.E.P.M. papers given at the annual meeting, held this year at St. Louis.

Symposium on reserves.—A 14-page section will give latest figures and data on reserves of petroleum, natural gas, and solid fuels (for conversion to liquid fuels) by outstanding authors.

Exploration in Mexico.—An extensive report on Petroleos Mexicanos activities in northeast Mexico, including seismic maps of nine structures.

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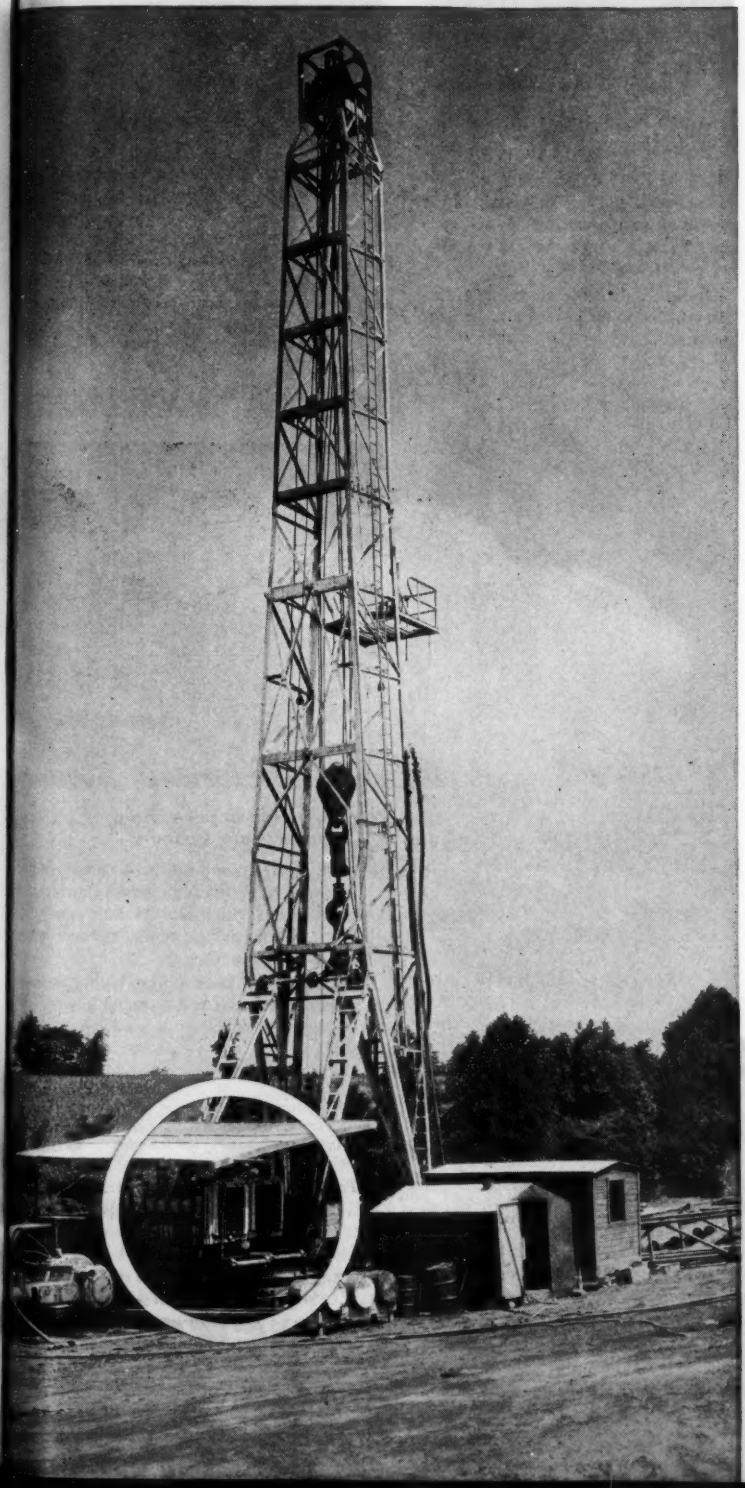

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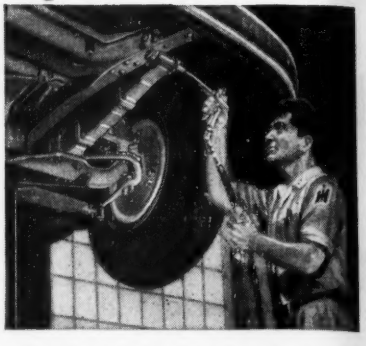

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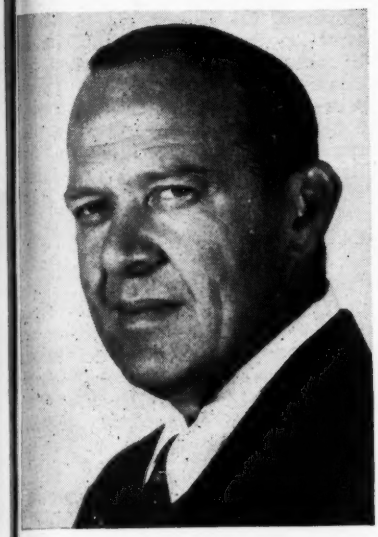

Wyman Named Assistant Head of Shell Refinery

A VETERAN of 20 years' service with Shell Oil Co., Inc., has been named assistant superintendent at the company's Deer Park refinery near Houston. He is Joseph B. Wyman, who formerly held the post of assistant superintendent in charge of cracking, topping, dispatching, and gas at the refinery.

Wyman replaces Ray W. Faulk, who has been named assistant personnel manager at Shell's main offices in New York City.

A graduate of Washington University, St. Louis, Mo., Wyman joined the Shell organization in 1928 as an experimental junior chemist at the company's Wood River, Ill., refinery. He was named assistant to the head stillman in 1932, and stillman in charge of cracking. Five years later Wyman was given the post of general assistant superintendent.

Between 1947 and 1949 Wyman was on leave of absence from the company, doing special work with an affiliated company. He returned to Shell's Deer Park refinery recently to assume responsibilities as assistant superintendent in charge of cracking.

Grover E. Ledlie, Jr., formerly in the oil business in Oklahoma, has moved to Calgary, Alta., Canada, where he will manage Alberta operations for Amcan Oil Corp., Inc. The company only recently entered the Alberta scene, and plans to explore 50,700 acres of Crown reservation surrounding the town of Castor, about 115 miles northeast of Calgary. Amcan also will drill several wells in Alberta in 1949. The firm is backed by the O'Shaughnessy interests of Kansas.

Frank E. Spencer, manager of the Chicago division fuel-oil department, Socony-Vacuum Oil Co., Inc., retired March 1. He formed the Spencer Petroleum Co. in 1922, and in 1941 the company became a division of Socony-Vacuum, with Spencer remaining as its president.

W. W. Lincoln, geologist and landman for Big West Drilling Co., Shreveport, La., has resigned to become an independent consulting geologist in Shreveport.

Roberto H. Wills, of the staff of Colombian Ministry of Mines and Petroleum, is expected to leave Bogota for New York late in March, to become petroleum attache in the consulate general's office in New York. Formerly with the Shell organization, Wills has been on the ministry staff the last year and a half. Principal purpose of the reopened office is to report on crude and product market prices in the United States.

G. B. KITCHEL

George B. Kitchel of Houston, has joined Kerr-McGee Oil Industries, Inc., as assistant to **Travis M. Kerr,** vice president in charge of the drilling department, with headquarters in Oklahoma City. Kitchel also will be in charge of the company's field operations. For the past 7 years Kitchel has been engineer in charge of drilling-equipment division, Humble Oil & Refining Co., serving as intermediate manager between production-department management and field personnel He is a graduate of Rice Institute, Houston, obtaining a B.S degree in mechanical engineering in 1931.

R. J. Holley, Gulf Oil Corp., has been named president of the Petroleum Engineers Club of Fort Worth, Tex., succeeding **R. S. Christie,** Amerada Petroleum Corp. Other new officers are: **J. A. Slicker,** Stanolind Oil & Gas Co., executive vice president; **R. H. Rantala,** Pure Oil Co., and **J. W. Sallee,** Dowell Incorporated, vice president; and **Jack O'Brien,** Oil Well Supply Co., secretary-treasurer.

Charles F. Sanderson and **Alan S. Glendening** have joined in the organization of the consulting firm of San-

C. F. SANDERSON

A. S. GLENDENING

derson-Glendening, Houston. Sanderson, who graduated from Drexel Institute of Technology in chemical engineering in 1940, joined the staff of Celanese Corp. of America in the research and development department. He had served as engineer for Lummus Co., for some time, and later joined the staff of Petroleum Engineering, Inc., Houston. Glendening, soon after graduating from Princeton University in 1944 in engineering, joined Petroleum, Inc., as process engineer. The newly formed consulting firm will be concerned with the light-hydrocarbon, natural gasoline, recycling, and organic-chemical industries.

S. P. Kent, field superintendent of Texas Petroleum Co., Venezuelan division, has transferred his headquarters to Maracaibo. Other recent changes in Texas Petroleum's organization include: **J. F. Tindol,** senior petroleum engineer, transferred to the company's Mara operations at Maracaibo; **Robert G. Hill.,** assistant field foreman at Tucupita, transferred to new duties for S. A. P. Las Mercedes at Mercedes field; **Douglas W. Ross, Jr.,** promoted to acting field superintendent of Texas Petroleum Co. in Colombia, with headquarters at Bogota.

B. C. Kitchen, Imperial Oil, Ltd., has been appointed purchasing agent for the company succeeding **L. E. Bury,** who is retiring after 42 years' service. Position of assistant purchasing agent will be held by **A. E. Rubery.**

Frank C. Lytle has been named district geologist at Shreveport, La., for Houston Oil Co. of Texas, succeeding **C. (Hott) Gibson,** who resigned to join W. T. Bryant interests of Tyler.

John C. Johnston has been named division geologist, and **William A. Matthews** has been made division geo-

PERSONALS

physical supervisor for Stanolind Oil & Gas Co., Casper, Wyo. Johnston succeeds **W. S. McCabe,** who recently was made division superintendent.

DR. S. J. PIRSON

Dr. Sylvian J. Pirson, former head of the division of geochemistry, Pennsylvania State College, has been appointed special-research associate for Stanolind Oil & Gas Co., Tulsa. He will assist **Lloyd E. Elkins,** who was recently named production-research director for the company. Dr. Pirson, a native of Belgium and a graduate of University of Louvain where he received a degree in mining civil engineering, will be engaged chiefly in reservoir-engineering research at Stanolind's Tulsa laboratories. He spent more than 12 years on the faculty of Pennsylvania State, where he taught petroleum engineering, reservoir engineering, geophysics, and geochemistry. Dr. Pirson attended University of Pittsburgh where he obtained his M.S. degree in petroleum engineering, and Colorado School of Mines, receiving his D.S. degree in geophysics.

Curtis Morris, Longview, Tex., will move to Houston April 1, where he will take up duties as new manager for Transcontinental Gas Pipe Line Corp.

E. C. R. Beard, second assistant general manager of Cia. de Petroleo Shell de Colombia, has been transferred to Shell's organization in Venezuela.

P. H. Reardon, Gulf Oil Corp., Fort Worth, Tex., has been named secretary-treasurer of the North Texas section, American Institute of Mining and Metallurgical Engineers. He succeeds **S. V. McCollum,** Continental Oil Co., who has been transferred to Ponca City, Okla.

Several changes have been made in the production department, Humble Oil & Refining Co. **J. S. McKinstry,** superintendent of the discontinued Roanoke district, was transferred to the Paradis district, replacing **A. J. Chesney.** Chesney replaced **W. T. Dabbs** as superintendent of the Bayou Sale district, and Dabbs is now superintendent of the new Colorado City district, West Texas division. **F. L. Lively,** superintendent of the discontinued Bayou des Glaise district, became assistant superintendent of the Avery Island district, replacing **J. C. Andries** who was transferred to North Crowley as assistant superintendent. **H. D. McClain** has been transferred from the Lovell Lake pressure maintenance plant to the Opelousas gas plant, now under construction, as plant superintendent. He was replaced at Lovell Lake by **J. H. Kinsey,** former mechanical supervisor at Katy gas plant. **Campbell M. Carothers,** senior petroleum engineer in the production-marine equipment division, was transferred to Willamar District, Southwest Texas division, as district petroleum engineer. He replaced **B. K. Bevill,** who went to the Wasson district, West Texas division. **J. E. Graham** was promoted to district petroleum engineer at Grand Isle. **M. W. Bunch** was transferred from the Darrow district to the Louisiana division office as district civil engineer. **J. T. Lee,** civil engineer in the Louisiana division, was transferred to Kelsey as district civil engineer to replace **W. B. Burklin,** who was made district civil engineer of the Kelsey gas plant construction district. **Clifton R. Crim,** district civil engineer, transferred from Sunniland in Florida to the Thompsons compressor plant construction district. Tool pushers who have been transferred are **E. W. Smith,** from Bayou des Glaise to Avery Island; **Wilson Black,** from Roanoke to Bayou Sale; and **J. E. Cox,** from Freeport to the California district.

Guy I. Warren, Corpus Christi, Tex., **Jack Porter,** Houston, and **Angus Wynne,** Longview, Tex., have been chosen by the executive committee of the Texas Independent Producers and Royalty Owners Association as a three-member group to urge Congress to limit imports.

Russel Burns, Union Oil Co. geologist, will direct geological phases of the company in Alberta Province, Canada. He formerly was stationed in Texas.

Walker L. Taylor, in charge of western producing operations for Imperial Oil, Ltd., at Calgary, Alta., Canada, has been appointed assistant general manager of the company's exploration and producing operations throughout Canada. He will have offices in the Toronto executive headquarters, where he will work with **M. L. Haider,** director of the company, and general manager of the producing department. Taylor will be succeeded by **Robert B. Curan,** formerly vice president and director of Carter Oil Co., and more recently in charge of Rocky Mountain states operations for W. H. Barber Co. of Minneapolis.

Directors of the newly organized Petroleum Club of Wichita, Kans. T. G. Wright, Stanolind Oil & Gas Co.; Thomas H. Allan, independent oil producer; George H. Bruce, Aladdin Petroleum Corp.; R. B. Parriott, Stickle Drilling Co.; N. D. Clark, Lion Oil Co.; George B. Collins, attorney; Jack H. Heathman, Heathman-Honaker Drilling Co.; S. A. Shannon, Sunray Oil Corp.; V. I. (Mike) Mercier, Lane-Wells Co.; W. H. Pattison, Deep Rock Oil Corp. Not shown in the photograph but also directors of the new club are Frank M. Brooks, El Dorado Refining Co., and R. S. Webb, consulting geologist. Heathman is president of the 100-member group

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Vernon T. Tracy, formerly division foreman of northern division, Pan American Pipe Line Co., Houston, has been appointed division superintendent of that division, replacing **H. W. Lambert,** resigned. Headquarters will be in Sabine, Tex. Tracy, a native of Mountain Home, Ark., studied mechanical engineering at Texas A. & M. College. He entered pipe-line work in 1933. **Milton Crow,** district foreman in the Quitman district of the northern division, succeeds Tracy as division foreman. **S. L. Surratt,** formerly division gager in the southern division, Alvin, Tex., has been transferred to Quitman as district superintendent replacing Crow. **Lee May,** district gager in the Pettus district, has been transferred to Alvin succeeding Surratt.

H. D. (Ike) Moore, former sales manager of W. T. Waggoner estate properties at Vernon, Tex., has been named general sales manager of Wood River Oil & Refining Co., Wichita, Kans. The Wood River company operates refineries at Duncan, Okla., and St. Louis, Mo.

Organization of Lakeland Oil Corp., a Michigan corporation authorized to engage in oil and gas exploration, development, leases, and royalties, was announced March 1 by **M. L. Guldenzoph,** Saginaw, Mich., president of the new firm. Guldenzoph has been manager of **C. W. Teater's** oil operations for the past 7 years. Teater recently retired from the oil industry. Offices of the new firm are located in Saginaw.

Joe G. Sauer, who resigned as district landman in West Texas for Cities Service Oil Co. effective April 1, will become an independent oil operator at Midland, Tex. Sauer spent more than 20 years with Cities Service and with the old Indian Territories Illuminating Oil Co., which was taken over by Cities Service in 1941.

B. B. Jennings, president, Socony-Vacuum Oil Co., Inc.; **C. L. Harding,** director in charge of Middle East affairs; **John C. Case,** director in charge of production; and **Frederic R. Pratt,** manager of marine transportation, are returning to New York aboard the Queen Mary which left England last week. Jennings and Harding were in Saudi Arabia and other Middle East areas; Case has been in Egypt; and Pratt was in England.

Onas Ferguson, Midland, Tex., head of the geological drafting department, Phillips Petroleum Co., has resigned and will become an independent oil operator. He had served in that post with Phillips for more than 3 years.

SHIFTS—

O. I. Jantz, foreman, Amerada Petroleum Corp., Angleton to El Campo, Tex.; **G. B. Evans,** engineer, Celanese Corp. of America, Corpus Christi to Brownfield, Tex.; **Albert Trammell,** engineer, Texas-N. Mex. Pipe Line Co., Katy to Sundown, Tex.; **I. A. Parmer,** superintendent, Coronado Oil Co., Lefors to Lubbock, Tex.; **John Greene,** engineer, Aurora Gasoline Co., Olney, Ill., to Evansville, Ind.; **James E. Cochran,** chemist, Northwestern Refining Co., St. Elmo, Ill., to Cushing, Okla.; **T. J. Oleszko,** engineer, Aurora Gasoline Co., St. Clair Shores to Dearborn, Mich.; **Harry F. King,** engineer, Sun Oil Co., Chester, Pa., to Blue Island, Ill.; **William F. Irvin,** engineer, Cities Service Oil Co., Bartlesville, to Oklahoma City; **W. M. Koehler,** engineer, Humble Oil & Refining Co., Houston to Kingsville, Tex.

J. P. Nolley, engineer, Humble Oil & Refining Co., Houston to Corpus Christi; **Frederick B. Capalbo,** engineer, Humble Oil & Refining Co., Odessa, Tex., to Houston; **R. D. Weekley,** superintendent, Continental Carbon Co., Sunray to Amarillo, Tex.; **D. W. Rogers,** superintendent, Delta Drilling Co., Tyler to Mexia, Tex.; **Eugene G. Lunsford,** foreman, United Gas Pipe Line Co., Duback to Kenner, La.; **M. B. Will[illegible],** engineer, J. Ray McDermott & Co., Inc., New Orleans to Harvey, La.; **Norman C. Smith,** geologist, Humble Oil & Refining Co., Tallahassee, Fla., to Los Angeles, Calif.

Luckey P. Lowery, foreman, Carter Oil Co., Shelbyville, Ill., to Pentwater, Mich.; **William T. Wells,** engineer, Gulf Refining Co., Toledo Refinery, Lansdowne, Pa., to Toledo, Ohio; **Loyd Graham,** superintendent, Falcon Seaboard Drilling Co., New Martinsville, W. Va., to Tulsa; **R. D. Swan,** superintendent, Mid-States Oil Co., Falls City, Neb., to Tulsa; **Jerry Wittels,** engineer, Wittels Oil Co., Drumright, to Tulsa; **James N. Wilson,** engineer, Seismograph Service Corp., Madill, Okla., to Erie, Colo.

DEATHS

John A. Gardner, pioneer driller who began work in Pennsylvania fields in the late 1800's, and who moved west to work in newly opened fields in 1895, died recently in Long Beach, Calif. He was a veteran of oil operations in Burma and India.

Moody V. Miller, 35, Keystone, Okla., long-time driller for Bean Drilling Co. in the Mid-Continent area, died February 27 in Houston.

Wilfred G. Lane, 64, one of the founders of Lane-Wells Co., manufacturers of a perforating tool invented by Lane, died March 3 in Los Angeles. He retired from the company 10 years ago.

Cornelius (Connor) O'Neill, 75, for half a century identified with Texas oil development, died February 28 in Wichita Falls, Tex. He moved to Texas in 1902 following the Spindletop discovery at Beaumont.

James H. Beil, pioneer Oklahoma oil driller who was a veteran in the development of the old Kiefer pool, died March 7 in Tulsa.

Fred Ritter, 71, Los Angeles, former partner of E. L. Doheny, California oil man, died February 28 in Los Angeles. He served for 12 years as vice president of Petroleum Security Co., which was sold to Standard Oil Co.

Emile J. Mary, 58, executive vice president and general manager of National Cooperative Refinery Association, died in McPherson, Kans., March 7. A native of New Iberia, La., Mary entered the oil business in 1915. He moved to McPherson in 1934, where he was employed by Globe Oil & Refining Co. The company was later taken over by N.C.R.A.

Thomas L. Matthews, 50, assistant manager, transportation-planning division, The Texas Co., New York, died February 27 in New York. He was supply manager for the Eastern seaboard for Petroleum Industry War Council.

Benjamin Franklin Foster, 63, retired executive in Standard Oil Co. (N. J.) organization, died February 28 in Rio de Janeiro. Foster had lived in Brazil 29 years, and retired in 1946 from service with affiliates of the Jersey company in Brazil and Chile.

Dwight E. Van Pelt, Sr., 61, chief engineer for Shell Rubber Co., Houston, and former engineer for Sinclair Oil & Refining Co., died March 3 in Houston.

Gustav Schorman, 80, Oil City, Pa., retired refinery worker for Pennzoil Co., died March 2 in Oil City. He worked for the oil company for 51 years before retirement in 1937.

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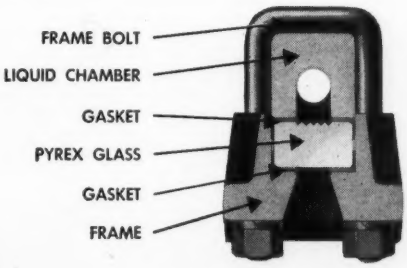

PENBERTHY PRODUCTS

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General Petroleum's Burrel Gasoline Plant Achieves High Extraction Efficiency

by M. E. Garrison*

A NATURAL-GASOLINE plant which has achieved an 80 per cent extraction level of propane potential and a 90 per cent extraction level of isobutane potential has been operated by General Petroleum Corp. in the Fresno area of California since April 1946. This high extraction efficiency has been particularly desirable since the demand for propane in the area which the plant is located has been growing at a remarkable rate.

Notable in the design and construction of the plant, which is designated as General Petroleum's "Burrel gasoline plant," is the unique plant gathering system, which is believed to be the largest ever installed in a natural-gasoline plant in California.

*Engineering department, General Petroleum Corp., Los Angeles.

Size and Purpose

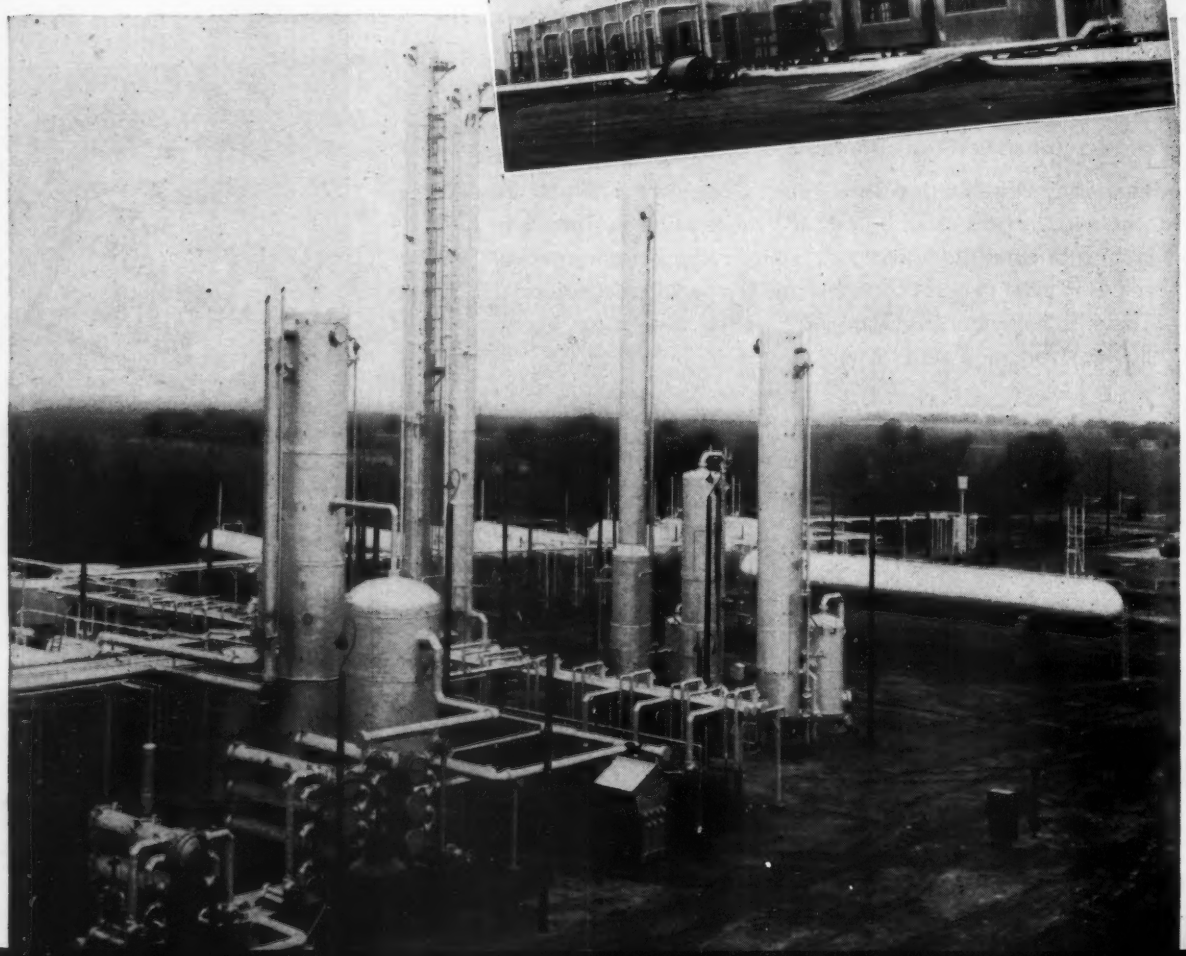
The plant was designed with a capacity of 30,000 M.c.f. per day of wet gas which was found to be available in the field at three pressure levels, 50, 150, and 450 psig.

Purposes of the plant are: (1) to deliver dry gas at 440-psig. pressure to a gas company; (2) to deliver dry gas at from 500 to 600-psig. pressure to another gas-company pipe-line system at a controlled maximum temperature 5° above wet bulb, and a minimum temperature of 60° F.; (3) to make possible the extraction and retention of 85 per cent of the isobutane content of the wet gas, and at the same time extract up to 70 per cent of the propane content of the wet gas.

The actual extraction in the 35 months the plant has been in operation has exceeded 80 per cent of propane potential and 95 per cent of the isobutane.

A fourth aim of the designers was to make possible selective absorption within the absorption plant to a point where extraction efficiency can be

Right: Compression and auxiliary equipment building in the Burrel plant of General Petroleum Corp. Below: Processing section of the three-pressure-level plant erected in the Fresno area of California



...Efficiency

controlled with a minimum quantity of recycled gas and with minimum plant fuel consumption. To accomplish this it was calculated that the most economical main absorption pressure would be 450-psig. pressure. The approximate average isobutane-plus-gasoline content of the combined wet gas was 1.3 g.p.m. and the 20 per cent rectified content 0.6 g.p.m.

Field Gathering System

Three areas are available from which the wet gas has to be collected: Helm field which lies northwest from the gasoline plant; Lanare field lying south of the gasoline plant; and the Riverdale field situated south and east from the gasoline plant.

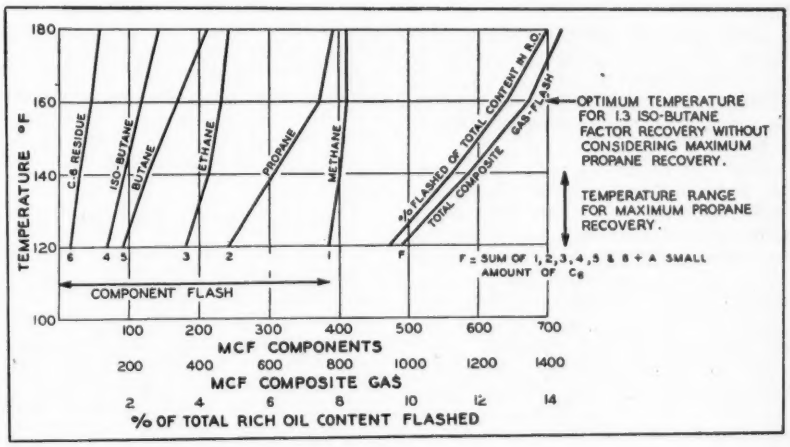
From Helm field a high-pressure wet-gas gathering line has been laid to the plant, approximately 8 miles in length, to deliver wet gas at from 440 to 450-psig. pressure at the gasoline plant. A low-pressure wet-gas line parallels the high-pressure wet-gas line to deliver wet gas at the plant at 50-psig. pressure. This permits two-stage gas-trap operation for the separation of the oil and gas as it flows from the producing well. All of the wet gas lines in general are laid to grade sloping towards the gasoline plant. The 50-psig. pressure wet-gas line carries the condensate for both lines through two sets of drip stations located in the field, and one set located at the entrance to the gasoline plant. Vertical drip pots were installed with level and pressure controls, in order to raise the condensate to successively higher elevation.

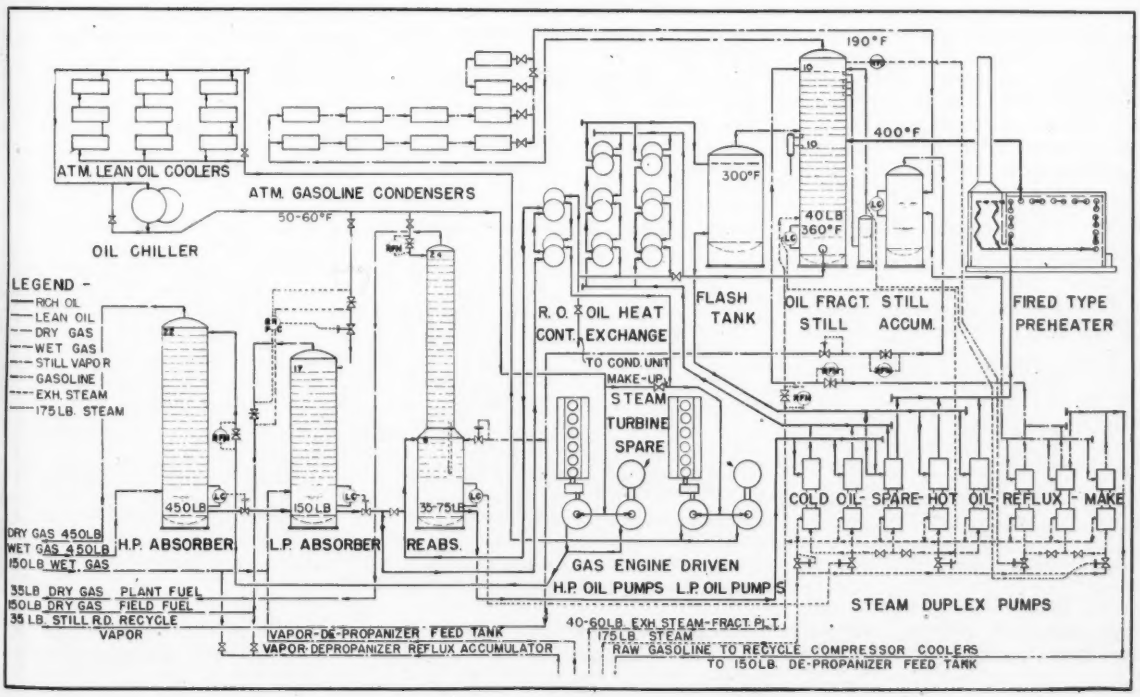
Heater Installations

On the 450-psi. pressure gas line, three heater installations have been installed to minimize the possibility of the formation of hydrates during the winter months. These are designed to maintain the gas temperature above 60° F. These heaters are of the circulating hot water type and are automatic in operation, requiring very little operating attention. Torrance heaters manufactured

Fig. 1—(Below) Flow scheme employed in the absorption section of the Burrel plant

Fig. 2—(Right) Curves showing relation between gas flashed at 35 psi. gage pressure to base of reabsorber, and temperature of flash





by Tivit Products, Inc., Torrance, Calif., were installed.

The heating element for heating the wet gas consists of a pipe jacket installed around the outside of the main gas line through which hot water from the Torrance heater is circulated by means of a motor-driven pump. For the 10-in. line this jacket was installed 80 ft. in length, and for the 6-in. line size the jacket was installed 60 ft. in length. A flanged expansion joint was installed in the center of each jacket pipe to accommodate for the unequal expansion between the jacket and the main gas line.

A 4-in. dry-gas line parallels the Helm wet-gas gathering line for approximately 3¼ miles west from the gasoline plant, where it ties to the Amerada Petroleum Corp. and to the General Petroleum Corp. dry-gas fuel systems. The dry-gas pressure on this line is approximately 140-psig. pressure.

Between the gasoline plant and Helm field a large irrigation channel, approximately 125 ft. wide, had to be crossed. A pipe-line suspension bridge was installed over this channel.

From Riverdale oil field was laid an intermediate-pressure wet-gas gathering line approximately 7½ miles long, to deliver gas at from 145 to 160-psig. pressure at the gasoline plant. To collect the low-pressure wet gas below 150-psig. pressure, two gas-engine-driven field compressor booster stations were installed.

A low-pressure wet-gas gathering pipe line parallels the 150-psig.-pressure pipe line for approximately 2¾ miles on the Riverdale end of the wet-gas collection system. This line delivers wet gas at from 20 to 50-psig. pressure to the field booster compressor stations. The suction pressure to these field compressors is regulated so as to not exceed 30-psig. pressure. These field compressors boost or compress this gas from 30 to 150-psig. pressure and deliver it into the intermediate-pressure gas line to the gasoline plant.

Two additional field compressor stations were later installed. One of these compresses wet gas and tank vapors from 5-in. vacuum to 150-psig. pressure and the other compresses tank vapors from 5 to 10-in. vacuum and delivers them into the 30-psig. pressure low-pressure wet-gas line to the aforementioned field booster compressors.

In general the 150-psig. intermediate-pressure wet-gas line slopes towards the gasoline plant and the low-pressure wet-gas line slopes towards the field booster compressor stations. Vertical drip-pot installations are located at each field compressor station in conjunction with intake wet-gas scrubbers. These vertical drip-pot installations are also located at the Murphy Slough crossing and at the entrance to the gasoline plant.

Also paralleling the 150-psig. intermediate-pressure wet-gas line was laid a 4-in. dry-gas line. This line extends from the plant approximately 5 miles easterly. This line delivers dry gas to Riverdale field. The dry-gas pressure on this line at the gasoline plant is approximately 140-psig. pressure.

System for Lanare Field

Lanare oil field is located to the south of the gasoline plant. A wet-gas collection line approximately 4½ miles long was laid from this field to the gasoline plant. This line originally tied into the intermediate 150-psi. pressure wet-gas line from Riverdale field at the plant entrance. Due to pressure decline in this field this line was later connected into the 50-psi. pressure wet-gas line from Helm field at the gasoline plant west property boundary.

In general the wet-gas gathering system, due to the long lengths of pipe line involved in order to collect the wet gas, was designed so that when future pressure declines had to be met, field booster compressors would be installed in order to maintain sufficient pressure and capacity.

The field booster compressor units consist of Waukesha 90-hp. gas engines V-belt driving heavy-duty Ingersoll-Rand twin-cylinder compressor units. The compressor units had previously been used elsewhere. A thermo-syphon oil compressor jacket-cooling system with a vertical surge tank was installed for cooling the compressor jackets.

Feature of Gasoline Plant Design

From the foregoing information it can be noted that there are four gas-pressure levels which may be considered for the absorption of the wet gas. At the 600-psi. pressure level only two-thirds of the dry gas had to be compressed. From this consideration it can be calculated that the most economical pressure for absorption would be 450-psi. pressure.

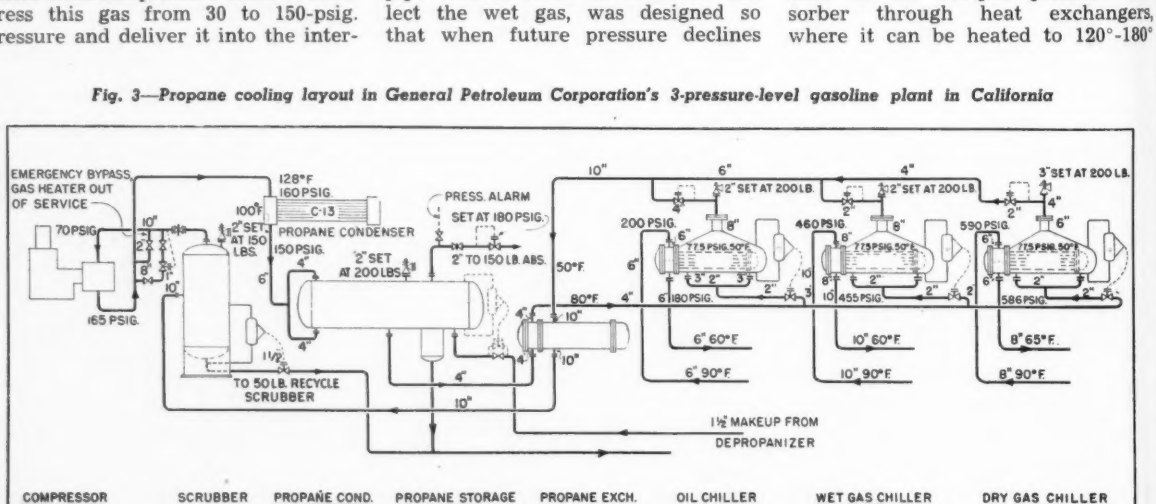
The next consideration is the arrangement or flow necessary to obtain selective absorption for the isobutane and propane content of the wet gas. The dry-gas fuel pressure considerations also enter into the calculations at this point.

A 150-psi. pressure level was decided upon as the most desirable fuel-gas pressure for delivery to the field.

It is to be noted that at the 150-psi. pressure level all the rich oil from the 450-psi. pressure absorber is flashed in the base of the 150-psi. pressure absorber. Additional wet gas is added to the 150-psi. pressure absorber as required to furnish field fuel and plant fuel makeup. In addition in order to make maximum propane yield the depropanizer vent gas vapors and the depropanizer feed tank vapor are returned to the 150-psi. absorber.

The rich oil then flows from the base of the 150-psi. pressure absorber through heat exchangers, where it can be heated to 120°-180°

Fig. 3—Propane cooling layout in General Petroleum Corporation's 3-pressure-level gasoline plant in California



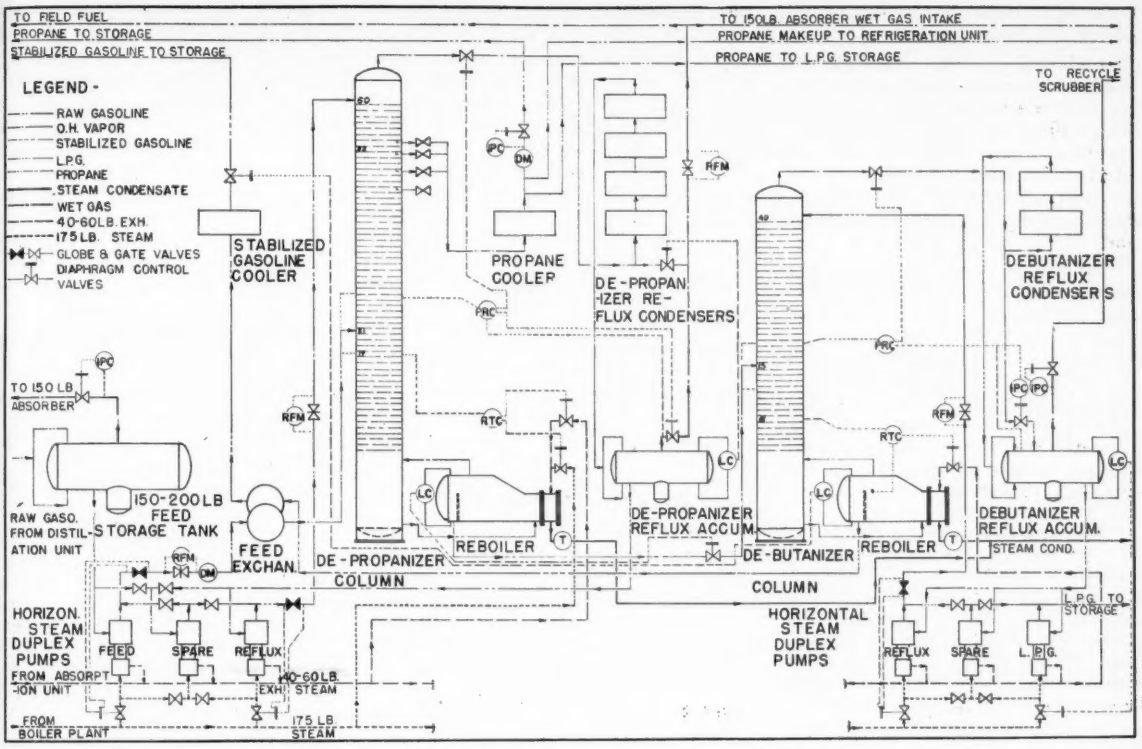


Fig. 4—Diagrammatic flow arrangement in the fractionating section of the Burrel natural-gasoline plant

F. temperature as desired. The heating medium is hot lean oil from the still. The hot rich oil passes from these heat exchangers into the base of a 35-psi. pressure reabsorber, where it is flashed. Selective absorption is made possible by the control of the oil-gas ratios on the 450, 150, and 35-psi. pressure absorbers and by the control of the rich-oil temperature to the 35-psi. pressure absorber. In order to accomplish this control, the raw gasoline still vapors are compressed from 30-35-psi. pressure to 150-160-psi. pressure and the raw-gasoline make, excess above reflux, is pumped into these compressed vapors in the coolers in the cooling tower on their way to the depropanizer feed tank. This flow eliminates the recycle vapor buildup commonly found in the older plants in operation in California.

Further consideration in the design at this point was the desirability of chilling the lean oil and wet gas, because of the temperature specification for residue dry gas sales at from 60° to 70° F. during both the summer and winter months. At this point, however, we are only interested in the fact that oil and gas temperatures may be selected for design regardless of seasonal atmospheric cooling conditions.

In order to design properly for the flow arrangement selected (see Fig. 1) an assumption of the gas quantities to be handled had to be made from the field data. Also, composite analysis of the wet gas had to be obtained from very preliminary laboratory data. Material balances and equilibriums were next calculated so that equipment could be properly selected for installation.

In Fig. 2 is plotted the daily volume of methane, ethane, and propane vented at temperatures from 120° to 180° F. for a 1.3 isobutane absorption factor throughout the three absorption steps. From these data it can be observed that the optimum temperature for the extraction of isobutane is in the neighborhood of 160° F. Also it can be observed that for maximum propane extraction the temperature should be in the neighborhood of 120° F. These temperatures refer to the flash temperature of the rich oil in the base of the 35-psi. pressure reabsorber. However, the propane extraction is dependent on the lean-oil temperature to the absorbers and the oil-gas ratio selected which sums up into the selection of a proper propane factor for the most economical recovery.

The elimination of the light hydrocarbon fractions of methane, ethane, and propane, from the rich oil in the 35-psi.-pressure reabsorber eliminates these vapors from contamination in the raw gasoline and performs the function of partial deethanization by means of selective absorption. These light fractions once condensed in the raw-gasoline stream in the past led to high recycle loads and considerable recompression in order to prevent gasoline losses. The method used in the design of the Burrel gasoline plant minimizes these vapors from the rich oil at the expense of only a small amount of additional oil circulation rate.

From material-balance and equilibrium data and the proposed flow sheet Fig. 1, it was possible to design all the equipment in the absorption circuit. The selection of gas-engine and steam-driven pump equipment was tied in with a utilization study of the exhaust-steam usage possible; i.e., still agitation, depropanizer, and debutanizer reboilers and for feedwater heat.

From a study of the absorption flow sheet (Fig. 1) it is to be noted that excess exchange surface needs to be provided in order to provide rich-oil temperature control to the reabsorber, and to provide as high a flash-tank temperature as possible. The higher the flash-tank temperature the lower will be the heat load required by the fired-type preheater, permitting a greater load capacity variation for the entire system.

The flash tank was made large enough to provide surge capacity for the entire distillation system. The fired-type preheater feed pumps take suction on the rich-oil flash tank and are controlled by the fractionating-still level control. The rich oil from the base of the reabsorber is pumped through the heat exchangers to the rich-oil flash tank and are controlled

by the level control installed on the base of the reabsorber.

The 450-psi. pressure absorber and the 35-psi. pressure reabsorber have fixed rate controllers installed on the lean-oil lines to them. The 150-psi. pressure absorber has a lean-oil-ratio controller installed, since the gas volume fluctuates to this absorber depending upon the dry gas fuel demand.

It is to be noted that the still vapors are connected into the reabsorber as well as to the recycle compressor, so that when the compressor shutdown for any purpose these vapors are not lost to air and have an emergency place to go. For this reason it has been found desirable to operate the still pressure some 5 to 10-psi. pressure higher than the reabsorber pressure.

Propane Refrigeration Unit

Selective absorption is further effected through the chilling of the wet gas and the lean absorption oil. Chilling the lean oil makes possible lower oil-circulating rates for a given isobutane absorption factor. Chilling of the dry gas delivered at 500 to 600-psi. pressure to the gas company's sales-distribution system is necessary during the summer months in order to obtain a 60° F. temperature. The formation of hydrates prevents carrying the gas temperature much below 60° F. while the lean-oil temperature may be carried down to 45° to 50° F. if so desired.

The flow sheet for the refrigeration unit is shown by Fig. 3. From this flow sheet it is seen that liquid propane from the depropanizer column is used for filling the accumulator tank after it has been properly cooled. From the accumulator tank the liquid propane passes through a heat exchanger in which the cold propane gas from the chillers in turn cools the propane liquid before expansion. From this exchanger the propane liquid enters the oil chiller, wet-gas chiller, and 600-psi. dry-gas chiller in parallel, being controlled by liquid-level regulating valves installed on each vessel named respectively.

In these chiller vessels the propane liquid is evaporated and passes off as a gas through back-pressure regulating valves to a common gas line. The back-pressure regulating valves are set to control or maintain at from 50 to 70 psi. back pressure depending upon the temperature desired. The propane gas after leaving the chillers passes through the heat exchanger to a compressor intake scrubber and to the compressor suction. The discharge gas from the compressor passes to atmospheric coolers in the induced-draft cooling tower where the propane gas is condensed as a liquid at approximately 150-psi. pressure, totally condensing. The propane liquid then flows back to the accumulator tank.

Any lubricating oil usually accumulated in the bottom of the chillers is bled off to the intake scrubber and then bled to the drain system.

It is to be noted that the volume of propane gas handled by the compressor will vary to meet the temperature conditions required. A bypass between the suction and discharge at the compressor station is installed for the operator to open when low gas rates and cold atmospheric temperatures are encountered. This is necessary in order to prevent propane liquid forming on the compressor cylinder walls. If desired this bypass valve could be replaced with a regulator operated by the suction pressure.

Gas Flow Through Plant

The 50-psi. pressure wet gas from Helm field together with the wet gas from Lanare field is piped through a wet-gas intake scrubber and composite-gas intake meter to the 50-psi. pressure compressor suction header. The 50-psi. pressure wet gas is compressed to 150-psi. pressure and is piped to atmospheric coolers in the induced-draft cooling tower and then joins with the 150-psi. pressure wet gas from Riverdale field on the way to the 150-psi. pressure wet-gas scrubber.

The wet gas is then piped to the compressor suction header and to the 150-psi. pressure absorber through a regulating valve controlled by the field fuel-gas line pressure. Vent gas from the depropanizer reflux accumulator and from the depropanizer feed tank is also connected into the wet-gas line to the 150-psi. absorber. The vent gas from the depropanizer reflux accumulator is alternately tied to the field fuel in case a maximum yield of propane is not desired.

The 150-psi. pressure wet gas is compressed to 450-psi. pressure and is connected to atmospheric coolers in the cooling tower and then to the wet-gas chiller where it is further cooled to 60° F. temperature. Leaving the chiller the 450-psi. pressure wet gas joins additional wet gas from Helm field after the meter manifold. Connections have been left so that the field 450-psi. pressure wet gas may also be chilled at a later date if desired. The composite 450-psi. pressure wet gas is piped to a scrubber for the removal of condensate, and is then piped to the 450-psi. pressure absorber.

The dry gas from the 450-psi. pressure absorber is piped through a dry-gas scrubber, meter, and back-pressure regulating valve where it then splits. One part of the gas is taken through another back-pressure regulating valve and delivered to the gas company's glycol dehydration unit, and the other part is piped to the 450-psi. pressure dry-gas compressor suction header. The 450-psi. pressure dry gas is compressed to 500-600-psi. pressure as desired and is piped to atmospheric coolers in the induced-draft cooling tower, to dry-gas chiller, and to a scrubber. From the dry-gas scrubber the gas passes to a sales meter and to the other gas company's pipe-line distribution system.

The fuel for the boilers and fired-type preheater is taken from the 35-psi. pressure absorber primarily with a makeup connection from the compressor fuel piping. The dry gas at 140-150-psi. pressure passes from the absorber through a meter and back-pressure regulating valve to field fuel. The compressor fuel connection is taken off ahead of the meter. The compressor fuel passes through a reducing regulator to a scrubber. It is reduced to around 30-psi. pressure.

All of the main gas services pass through a meter manifold. Each gas service is protected with a stack to air line in which is installed a back-pressure regulating valve. On each service stack to air line is installed a meter for measuring any gas that might pass to air due to irregular plant operation. Each service stack to air line is connected into one common large stack line which is located in the southwest corner of the plant at a safe distance from all equipment.

For the purpose of piping convenience the arrangement at the meter manifold has been worked out into parallel meter runs which are listed from west to east as follows:

50-lb. field gas, wet-gas intake meter.
50-lb. field gas, wet-gas stack to air meter.
450-lb. field gas, wet-gas intake meter.
450-lb. field gas, wet-gas stack to air meter.
150-lb. plant dry-gas stack to air meter.
150-lb. plant dry gas to field fuel meter.
150-lb. field gas, wet-gas intake meter.
450-lb. plant dry-gas stack to air meter.
150-lb. field gas, wet-gas stack to air meter.
35-lb. plant dry gas to air meter.
30-lb. plant compressor fuel meter (located to the north of the manifold) and at the absorbers is located the following:
35-lb. reabsorber dry-gas fuel meter.
450-lb. absorber dry-gas composite meter.

Handling of Drip Condensate

The drip condensate from the 450-psi. pressure gas-gathering system is expanded into the 50-psi. pressure gathering system in the field. At the gasoline plant, the 450, 150, and the 50-psi., pressure condensate from the vertical drip pots located at the entrance of the wet gas to the plant are all connected into the 50-psi. pressure wet-gas intake scrubber.

The drip condensate from the 50-psi. pressure wet-intake-gas scrubber and from the 35-psi. pressure dry-gas scrubber are piped to a 6-ft. diameter by 20-ft.-long dirty drip storage tank. The oil drains from the 450-psi. pres-

(Continued on page 93)

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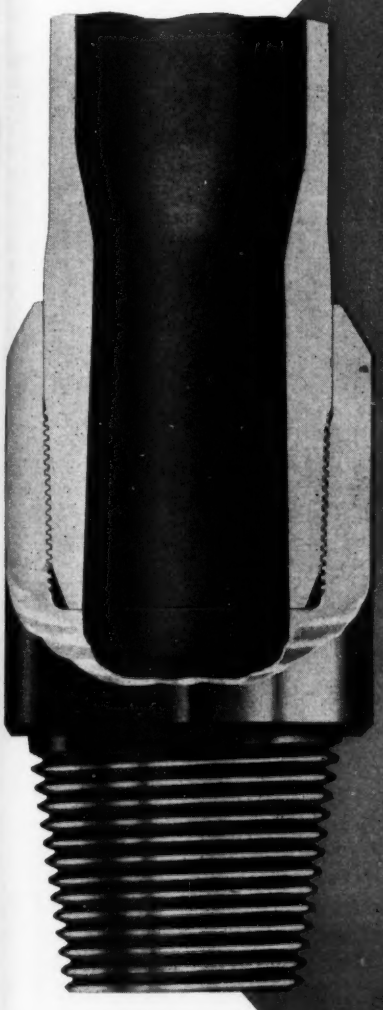

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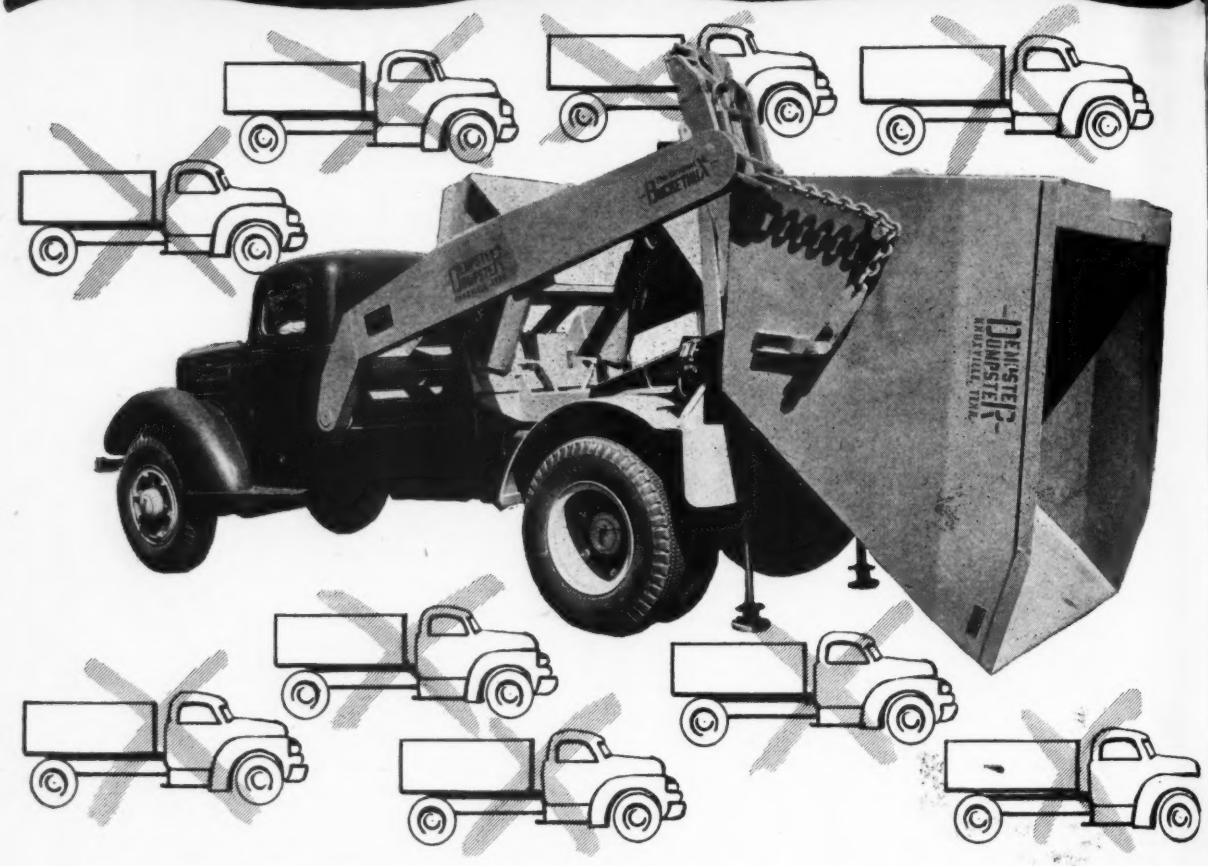
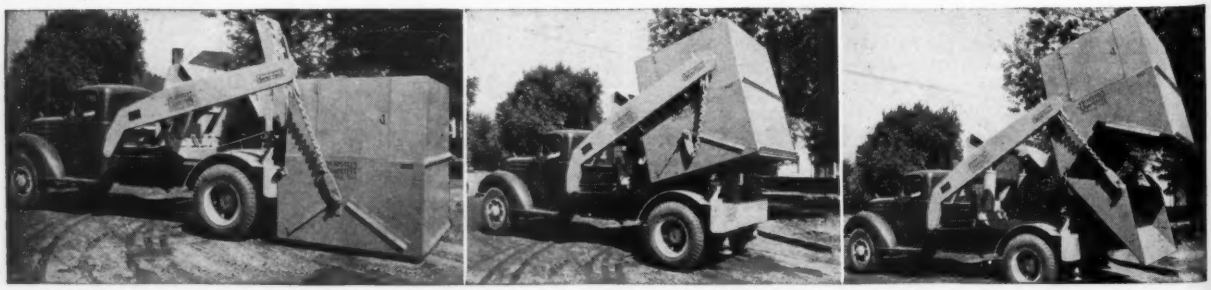
One Dempster-Dumpster with 99



Being a large operation, this copper smelter required ten trucks and their crews, a series of push cars, a train car system and loading crews to handle over twenty different kinds of materials on relatively short hauls between plant buildings and outside of the grounds. The materials handled included, scrap of all descriptions, trash, rubbish, new and used brick, excavation spoil, waste oils, filter cake, dust, sand, gravel, cement, fire clay and many others.

A large majority of the handling, re-handling, storage, truck and car equipment and crews standing idle, was eliminated by the Dempster-Dumpster System. Simply stated, this system provides quick pick-up of pre-loaded containers for hauling, dumping or moving material to another location. The three pictures below show how it operates. The left illustration shows the Dempster-Dumpster truck hoisting unit approaching a loaded container. Two chains are attached and the driver returns to controls in the cab. In the center photo, loaded container is hydraulically raised into carrying position. Controls in the cab permit dumping as illustrated at right. You too, may be able to adapt the Dempster-Dumpster System of Materials Handling to your business at tremendous savings. Let one of our engineers discuss this possibility with you.

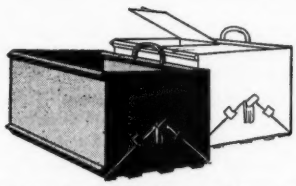


Containers replaces 9 trucks....

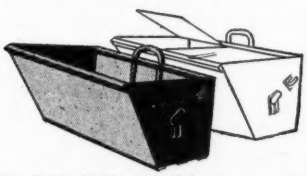
Over $50,000 saved annually . . . in this Copper Plant through faster, more efficient, materials handling

Here, in plain language, is what happened to Materials Handling costs after the Dempster-Dumpster System of Materials Handling was installed in a large Western copper smelting plant. A comprehensive Dempster-Dumpster survey had previously revealed costly delays, unnecessary handling and rehandling of materials, and much time wasted by loading crews. All have been eliminated to the tune of $50,000 savings annually. Fast pick-up, hauling and dumping of pre-loaded Dempster-Dumpster containers has replaced the old method of plant hauling. As a result, nine of the ten trucks formerly detailed for this work were eliminated or put on other work. Ninety-nine detachable containers, built in over 20 sizes and designs for the specific materials they were to handle, were spotted at material accumulation points throughout the plant. Some containers, provided with roller bearing casters, are rolled to indoor accumulation points. Some are handled by fork trucks, other by overhead cranes within plant buildings. As containers are filled, the Dempster-Dumpster truck hoisting unit and one man, the driver, picks each container up, hauls it to its destination, dumps it and returns the empty container for refilling or, loaded container is lowered at any point and left if desired. When you consider that pick-up and dumping of these detachable containers takes less than 60 seconds, and that the entire operation works to an on-the-run schedule, you will realize how one truck hoisting unit can handle 99 containers and do the work formerly requiring ten conventional trucks.

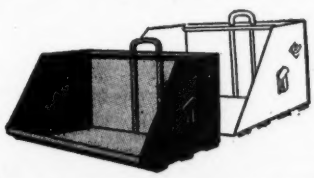
In the panel below are shown the basic types of Dempster-Dumpster Containers used in this installation. The basic containers can be altered with lids, casters, hose and chute connections, etc., to handle accumulations of any type material whether it be liquid, solid, dust, gas, light or heavy materials.



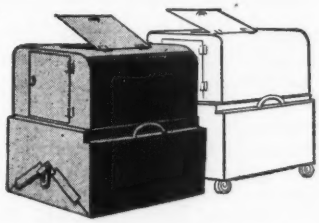
Forty-nine open top, drop-bottom containers in 3, 4, 8 and 10 cu. yd. capacities were spotted at 38 locations throughout the smelter operation. Four of these were 10 cu. yd. containers fitted with two end doors and a circular top opening for chute loading. Three of the 34—4 cu. yd. drop-bottom containers in this group were equipped with self balancing spring lids for special use.



Ten water tight, Tilt-Type containers were required to handle liquids or moist materials. Four of these were open top of 1½, 3 and 4 cu. yd. capacities for four locations. One 4 cu. yd. container with self balancing spring lids was provided at Lab Sample Mill. Three containers, with self balancing lids provided with pipe inlets, were supplied for receiving waste oil at three separate locations. Two 3 cu. yd. containers having three separate compartments with individual lids for each compartment, were required for the zinc electrolytic plant.



Two 4 cu. yd. skip-type, with lip, containers and two 4 cu. yd. skip-type, flat-bottom, containers were spotted at two locations. One 6 cu. yd. flat-bottom, skip-type container was furnished.



Thirty-three Universal-type containers in 6 and 10 cu. yd. capacities were spotted at 33 locations to receive trash, rubbish and other bulky materials. Two of these were mounted on roller bearing casters for movement to indoor loading locations.

Two 10 cu. yd. Apartment-type containers were spotted at the main office and laboratory office to receive large accumulations of waste paper and trash.

DEMPSTER DUMPSTER TRADE MARK REG. SYSTEM

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An Empirical Method of

Measuring Oil-Pool Performance

by Carlton Beal

This article introduces the use of the "Y" factor which is a pool-performance index in terms of barrels of oil recovery per 1,000 psi. decline in reservoir pressure per acre-foot of bulk active oil reservoir volume originally containing oil. A survey of 115 oil pools throughout the United States shows that there is a simple correlation of "Y" with reservoir control for both sandstone and limestone pools that do not produce condensate.

From the use of these performance indices it is shown by example that one can predict with reasonable assurance (1) reservoir control early in the life of the pool before there is sufficient reservoir and production data available for more accurate computations, (2) ultimate oil recovery, (3) original reservoir volume in depletion type reservoirs, and (4) volume of oil movement between wells on a leasehold and an oil pool which is producing under depletion control.

The author is a petroleum consultant located in Los Angeles; the article given here is material from a manuscript released February 19, 1949, detailing a summary presentation before a Los Angeles A.I.M.E. meeting.

THIS paper introduces the use of the pool performance index Y, defined as follows:

$$Y = \frac{1{,}000\ R}{V\ (\Delta P)}$$

Where

Y = performance index, bbl. per psi. per acre-foot
R = cumulative oil production to date, bbl.
V = reservoir bulk volume, acre-feet
ΔP = average reservoir pressure drop, psi.

For future research and correlation work there is also included a term for net pore space:

$$Y_o = \frac{1{,}000\ R}{V\ (1 - S_w)\ (\Delta P)\ \phi}$$

Where

Y_o = performance index, bbl. per psi. per acre-foot of net hydrocarbon pore space
S_w = interstitial water saturation expressed as a decimal fraction of pore space
ϕ = effective porosity, as a decimal fraction of pore space

Oil-reservoir pressure decline and bulk volume data were collected from oil operators, state engineering reports, varied publications, and by personal contact. Each pool was assigned a code number because in most instances, operators requested that the pool name be kept confidential.

Tabulated Basic Pool Data

Table 3 summarizes data for several of the 115 oil pools studied throughout the United States. This table contains 28 reservoir items divided into four parts: volume, data, performance, and control. "Original reservoir pressure" (Item 11) is original in all cases except if depletion occurred above the bubble point (ABP) and below the bubble point (BBP), in which case the original reservoir pressure is the first available average pressure BBP.

Item 13 is the solution gas-oil ratio at the pool average bubble-point pressure (Item 12). "R" (Item 15) is net oil recovered. Monthly pressure decline (Item 18) is for the last known time period.

Performance index Y (Item 22) is computed separately for depletion ABP and BBP from the previous tabulated information. Performance indices were obtained from pools before the beginning of gas injection (example: Arkansas Field No. 5—Limestone) or water injection (example: Arkansas Field No. 8 — Limestone). Values of Y_o (Item 23) are also computed for future research work.

Classification of Pools—Type Numbers

Reservoir control is contained in Items 24 and 28 inclusive, and each pool was given a type number (Item 28) depending on its reservoir behavior, a key to which is in the first column of Table 1 and 2. Several oil pools with original gas caps were classified Nos. 1 and 2 because little or no use had been made of the original gas-cap energy to maintain pressure (example: California Field No. 46—Sandstone). In addition to deple-

TABLE 1—RECAPITULATION OF RESULTS—SANDSTONE RESERVOIRS

Type No.*	Type of reservoir control	No. of pools	Y factor	Y_o factor	Porosity ϕ	Perm Kair	Depth (ft.)
	Depletion—no original gas cap:						
S-1	Press ABP	19	30.6	268	20.8	174	7,711
S-2	Press BBP	17	67.1	494	18.9	189	6,581
	Depletion—original gas cap:						
S-3	Press ABP	1	30.6	238	21.5	130	8,000
S-4	Press BBP	3	50.1	579	14.7	68	5,010
	Water drive—no original gas cap:						
S-5	Press ABP	19	230	1,705	22.2	852	6,762
S-6	Press BBP	21	547	1,576	28.4	379	4,787
	Water drive—original gas cap:						
S-7	Press ABP	1	170	1,290	20.0	1,000	8,200
S-8	Press BBP	5	236	1,166	24.0	655	5,840
	Condensate:						
S-9	Depletion	1	1.9	22	13.5	140	10,000
S-10	Water drive	0	..	....	....	....	....
S-11	Gravity drainage	4	435	561	22.5	1,043	5,625
	Total	92					

*See Table 3, Item 28.

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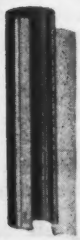

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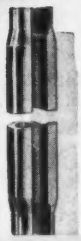

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TABLE 2—RECAPITULATION OF RESULTS—LIMESTONE RESERVOIRS

Type No.*	Type of reservoir control	No. of pools	Y factor	Y_o factor	Porosity ϕ	Perm Kair	Depth (ft.)
	Depletion—no original gas cap:						
L-1	Press ABP	7	14.3	96	14.5	844	5,280
L-2	Press BBP	5	63.2	373	14.0	967	5,470
	Depletion—original gas cap:						
L-3	Press ABP	0	....	....	....	....	....
L-4	Press BBP	2	82.5	....	13.0	....	4,590
	Water drive—no original gas cap:						
L-5	Press ABP	6	730	9,923	12.3	882	5,876
L-6	Press BBP	13	723	1,469	15.5	433	4,626
	Water drive—original gas cap:						
L-7	Press ABP	1	122	1,110	16.8	1,500	7,350
L-8	Press BBP	3	195	1,128	18.4	1,150	6,123
	Condensate:						
L-9	Depletion	2	3.5	33	16.0	375	9,066
L-10	Water drive	2	521	3,272	18.5	1,075	8,450
L-11	Gravity drainage	1	78	....	....	....	4,900
	Total	42					

See Table 3, Item 28.

tion-type and water-drive pools there is also classified for comparison, condensate, and gravity drainage reservoirs.

Discussion of Results

Tables 1 and 2 are a recapitulation of 115 pools included in the survey, giving the average performance indices for both limestone and sandstone reservoirs in accordance with the type numbers. Nineteen pools are entered twice because of depletion history ABP and BBP. Results show that there is a marked difference in performance indices among pools depending on the existing type of reservoir control. The average depletion-type sand reservoir ABP has a Y of 30.6 and depletion-type sand reservoirs BBP average 67.1. Y values for depletion-type limestone reservoirs average 14.3 ABP and 63.2 BBP. Depletion-type sand reservoirs with an original gas cap show average performance indices of the same order.

In contrast, however, water-drive sandstone pools with no original gas cap have an average Y of 230 ABP and 547 BBP. Limestone water-drive reservoirs with no original gas cap show an average Y of 730 ABP and 723 BBP. An interesting fact is that depletion-type sandstone reservoirs have an average permeability to air of 180 md. compared to permeabilities in excess of 375 md. for water-drive sandstone pools. However, Y values for limestone pools show no apparent relation to permeability, and reservoir control seems to be independent of permeability.

There are insufficient data to draw conclusions in the case of pools with original gas caps but the few results that have been collected agree closely to those of pools with no original gas cap for both depletion-type and water-drive reservoirs. Condensate depletion-type pools show an average Y of 1.9 to 3.5 and this low value appears to be many times greater if water drive is present. Gravity-drainage reservoirs yield intermediate to high performance indices in the order of that found in water-drive pools.

Variation in Reservoirs

The average Y of 14.3 for depletion-type limestone reservoirs ABP compares with a calculated value of 15.5 for pure fluid expansion in a closed reservoir of average porosity and interstitial water saturation.[1] The fact that depletion-type sand reservoirs ABP with no original gas cap average a Y factor of 30.6, over twice the calculated value, indicates the difficulty in drawing too general conclusions owing to wide variation in reservoir characteristics. Depletion-type sand pools ABP show Y values varying from 2.8 to 76 with an average of 45.5 per cent from the arithmetic average of 30.6.

TABLE 3—SUMMARIZATION OF RESERVOIR DATA AND

(Data for 120 fields are presented here,

Item No.	Reservoir characteristics and units—	Limestone fields— Arkansas Field 5	Arkansas Field 7	Arkansas Field 8	West Edmond (Okla.) Field 81
	Reservoir volume:				
1	Area, acres	2,720	3,360	1,800	31,400
2	Thickness, ft.	9.4	100	81.4	25
3	Black oil volume, acre-ft.	25,600	0	146,200	785,000
4	Gas-cap volume, acre-ft.	0	336,000	0	0
5	Total volume, acre-ft.	25,600	336,000	146,200	785,000
	Reservoir data:				
6	Depth, ft.	....	9,500	6,340	6,900
7	Porosity, ϕ, per cent	18	17	21.3	7
8	Permeability, K, md. (air)	22	650	145	Low
9	Connate water, S_w, per cent	22	20	20	20?
10	Oil gravity, °A.P.I.	39	58	36	41
11	Original pressure, P_o, psig.	2,344	4,365	2,920	3,160
12	Bubble point, P_{bp}, psig.	....	....	2,528	2,755
13	Gas-oil ratio, R_{bp}, cu. ft. per bbl.	....	....	283	1,010
14	Type of production	B.O.	Condensate	B.O.	B.O.
15	Cum. oil to date, R, MB	157	4,700	1,900	6,100
	Reservoir performance:				
16	Pressure, to date, P_t, psig.	2,097	3,740	2,660	2,811
17	$P_o - P_t = \Delta P$, psig.	247	625	260	349
18	Pressure decline, psi. per mo.	....	10.4	....	....
19	Initial G/O, R_o, cu. ft. per bbl.	....	8,900	....	1,010
20	Current G/O, R_t, cu. ft. per bbl.	....	....	....	1,010
21	Water cut, per cent	Low	....	Increasing	Low
22	**Performance index, Y, bbl. per psi. per ac.-ft.**	**24.8**	**22.5**	**50**	**22**
23	**Performance index, Y_o, bbl. per psi. per ac.-ft.**	**177**	**165**	**294**	**397**
	Reservoir control:				
24	Depletion type	Yes	....	....	....
25	Water drive	....	Partial	Partial—then complete	Partial
26	Gas-cap expansion	....	....	....	....
27	Remarks	ABP now gas injection	C	ABP now water injection	ABP
28	Type number	L-1	L-10	L-5	L-5

NOMENCLATURE

B = barrels
C = condensate
L = lime reservoir
M = 1,000
R = cumulative oil production from an oil pool to date, bbl.
S = sand reservoir
V = reservoir bulk volume containing active oil, acre-feet
Y = performance index, bbl. per psi. per acre-foot
Y_o = performance index, bbl. per psi. per acre-foot of net hydrocarbon pore space
ϕ = effective porosity, as a decimal fraction of pore space
ABP = principal portion of pressure decline above bubble point
BBP = principal portion of pressure decline below bubble point

Values of Y vary from 13.7 to 190 for depletion type sand pools BBP and the deviation from the average Y of 67.1 is 38 per cent.

Values of Y for gravity-drainage pools have a wide variation and it appears to be almost impossible to determine presence of gravity drainage deviation of 45.5 per cent from the arithmetic average of 30.6.

well performance. Oklahoma City (Field 79—Sandstone) for example has a Y of 136 which could be a depletion-type pool with small water encroachment; however, individual well behavior indicates that this is a gravity-drainage reservoir.

Y values for water-drive reservoirs show great variation and without exception Y is greater in magnitude than for depletion-type pools.

Limitations of Present Correlation

Comments on Y factor characteristics at this time are:

1. Performance index Y is useful for the general checking of pool performance. It is particularly useful during the early life of an oil reservoir before accurate computations can be made.

2. Y disregards production efficiency but it is pointed out that the greater the recovery efficiency for a pool the higher will be values of Y.

3. Y is difficult to evaluate for pools containing large gas caps that are shut in to conserve pressure.

4. Y is of less value for oil pools of extremely low permeability such as Fullerton and West Edmond. High-permeability reservoirs appear to yield more consistent results.

5. The Y factor is not dependable for evaluating oil pools in which the reservoir limits are not accurately known because of small reservoir volume and wide well spacing. The pool must be thoroughly explored as to size and thickness in order to accurately determine Y.

Practical Applications

A. Determine reservoir control early in life of pool.

Example 1.—California Field 11 (sandstone) is a newly developed pool, produces very little water, has a low gas-oil ratio (ABP), and no P.V.T. data available; what is the reservoir control? Reservoir volume is 22,500 acre-ft. of oil sand. The reservoir pressure has declined from 1,780 to 1,724 psig., representing a decline of 3.1 per cent after producing 228,600 bbl. of oil. It is conceivable that the pool might have at first appeared to be depletion type based on gas-oil ratio behavior, rapid pressure decline, and no increase in water production; therefore preliminary reserve estimates would be low. However, calculation of Y = 180 indicates possibility of water drive and corresponding increase in reverse estimates at an early date are as follows:

Type of discovery—	Estimated ultimate oil recovery: Recovery efficiency (%)	Estimated ultimate oil recovery: M bbl.
Depletion type (indicated without Y factor)	22.0	5,750
Water drive (indicated with Y factor)	40.0	10,400

Actual production to date is over 4.5 million barrels of oil after a decline of only 26.8 per cent in reservoir pressure.

Example 2.—Mississippi Field 69 (sandstone) shows a Y = 75 after a decline in reservoir pressure of 10 per cent. Gas-oil ratios continued at a low level indicating ABP production so that the expected Y would be 30.6 for a depletion-type pool. This value of Y = 75 indicates water drive which was confirmed in later history as Y increased to 248.

B. To check estimates of original active oil volume in depletion-type reservoirs.

Example: West Edmond lime, Oklahoma (Field 81).

Unknown: Active (relative to sand porosity) reservoir volume.

Reservoir control: Probably depletion type because of extremely low average permeability.

Dr. Max Littlefield et al[2] calculates 600×10^6 bbl. of original tank oil in place which requires an average pay of 88 ft. on 30,000 acres of 2,640,000 acre-ft. of active reservoir volume using a porosity of 7.0 per cent. On November 15, 1944, pressure had declined 349 psi. (11.2 per cent) from original pressure of 3,160 psig. after producing 6.1 million barrels of oil at low gas-oil ratio or a recovery of 17,500 bbl. per pound square inch pressure decline, all ABP.

From Table 2, observed average Y for limestone depletion-type pools ABP is 14.3 when ϕ = 14.5 per cent.

Therefore, V = active reservoir volume

$$= \frac{17{,}500 \times 1{,}000}{14.3} \times \frac{14.5}{7.0}$$

V = 2,540,000 acre-ft.

This value (as adjusted for the spe-

(Continued on page 96)

PERFORMANCE INDICES Y AND Y$_o$ (ITEMS 22 AND 23)
of the 115 fields recorded and interpreted)

	Sandstone fields								
				Oklahoma City (Field 79					
Texas Field 122	California Field 11	California Field 46	California Field 46			Mississippi Field 69	Louisiana Field 54	Texas Field 85
57,000	150	2,200	2,200	15,500	15,500	1,720	1,080	3,580
50	150	198	198	57.5	57.5	20	30	13
2,850,000	22,500	365,000	365,000	892,000	892,000	34,400	32,400	46,600
Large	0	65,000	65,000	.....	.....	0	0	75,000
2,850,000	22,500	430,000	430,000	892,000	892,000	34,400	32,400	121,600
4,900	5,500	7,800	7,800	6,000	6,000	4,830	11,500	2,300
.....	26.3	20	20	21	21	28	.....	15
.....	435	140	140	628	628	740	High	320
.....	30	40	40	1%	1%	28	.....	40
34	24	34	34	41	41	40	42	30
1,850	1,499	3,150	3,550	2,686	1,640	2,000	6,725	1,290
.....	1,644	3,050	3,050	.....	.....	788	5,500	1,210
.....	333	750	750	795	795	123	4,400	185
B.O.	B.O.	B.O.	B.O.	B.O.	B.O.	B.O.	B.O.	B.O.
.....	2,717	34,600	8,500	69,800	185,200	8,380	433	3
1,393	1,302	1,290	3,150	1,640	111	1,015	5,655	1,200
457	197	1,860	400	1,046	1,529	985	1,070	90
.....	0.71	.....	15	.....	32	5.7	.....	.....
.....	.....	1,000	750	.....	.....	.....	.....	2,000
.....	.....	4,000	1,000	.....	.....	100	.....	.....
.....	Slow inc.	12	3%	Low	Low	Increasing	.....	Moderate
78	**611**	**43.9**	**49.5**	**75**	**136**	**248**	**12.5**	**0.3**
.....	**3,320**	**362**	**411**	**351**	**655**	**1,240**	.....	**3.33**
..... Yes	.....	..... Yes	..... Yes	..... Yes	..... Yes	.....	..... Yes	.....
.....	..... Yes	.....	.....	.....	.....	..... Partial	.....	..... Partial
..... Yes	.....	..... None	..... None	.....	.....	.....	.....	..... Yes
GD	BBP	BBP GC not utilized	ABP	ABP	BBP GD	ABP	ABP	GC & WD now gas injection BBP
L-11	S-6	S-2	S-1	S-1	S-11	S-5	S-1	S-8

AND ABBREVIATIONS

BO = black oil (not condensate)
Cav = cavernous porosity
Con = constant
GC = gas cap
GD = gravity drainage
G/O = gas-oil ratio
Inc = increasing
Neg = negligible
ΔP = average reservoir pressure drop, psi.
P_{bp} = bubble point press. (for pool), psig.
P_o = original pressure, psig.
P_t = reservoir pressure to date, psig.
R_{bp} = original solution gas-oil ratio
R_i = current gas-oil ratio
R_o = initial gas-oil ratio
SGC = small gas cap
S_w = Interstitial water saturation, expressed as decimal fraction of pore space
WD = water drive

West Tepetate Louisiana . . .

First Dually Pressure-Maintained, Completely Unitized Field in United States

by W. L. Horner* and C. W. Ziemer†

RESERVOIR engineering studies made during the third year of production from the two principal oil pools in West Tepetate, Louisiana, gas and oil field showed the remaining recoverable hydrocarbons to have a value of 44.5 million dollars. The engineering studies showed, however, that there was an important "contingency" attached to this 44.5-million-dollar evaluation of the recoverable oil and gas. The studies indicated quite clearly that that amount of reserves could be obtained only if systematic pressure-maintenance operations were conducted during the life of the pool. The pressure-maintenance operations in turn required unitization of both the working interests and the royalty ownership of the different acreage parcels making up the gas and oil reservoirs, which are two in number.

*Chief engineer and †Production engineer. Barnsdall Oil Co., Tulsa.

The initial objectives of the reservoir studies made of the West Tepetate reservoirs to secure the maximum recovery have just recently been reached. This pool is now producing under a unit-operation agreement, a royalty-ownership-unitization agreement, and official authorization from the Louisiana Department of Conservation. Moreover, pressure-maintenance operations, by the introduction of both compressed gas and extraneous water, have been carried on already for 24 months. Thus, West Tepetate probably has the distinction of being the first dually pressure maintained, completely unitized oil operation in the United States.

Development of West Tepetate

West Tepetate field is located in Jefferson Davis and Acadia parishes, Louisiana, about 12 miles north of Jennings. The discovery well, 1 M. D. Miller, owned by Barnsdall Oil Co. and Vincent & Welch interests, commenced commercial production in October 1944 from the Miller No. 1 zone. Production of oil from the Miller No. 3 zone began in May 1945.

The two productive sands are of Miocene age, and are at about 8,500 and 8,400-ft. depth, respectively.

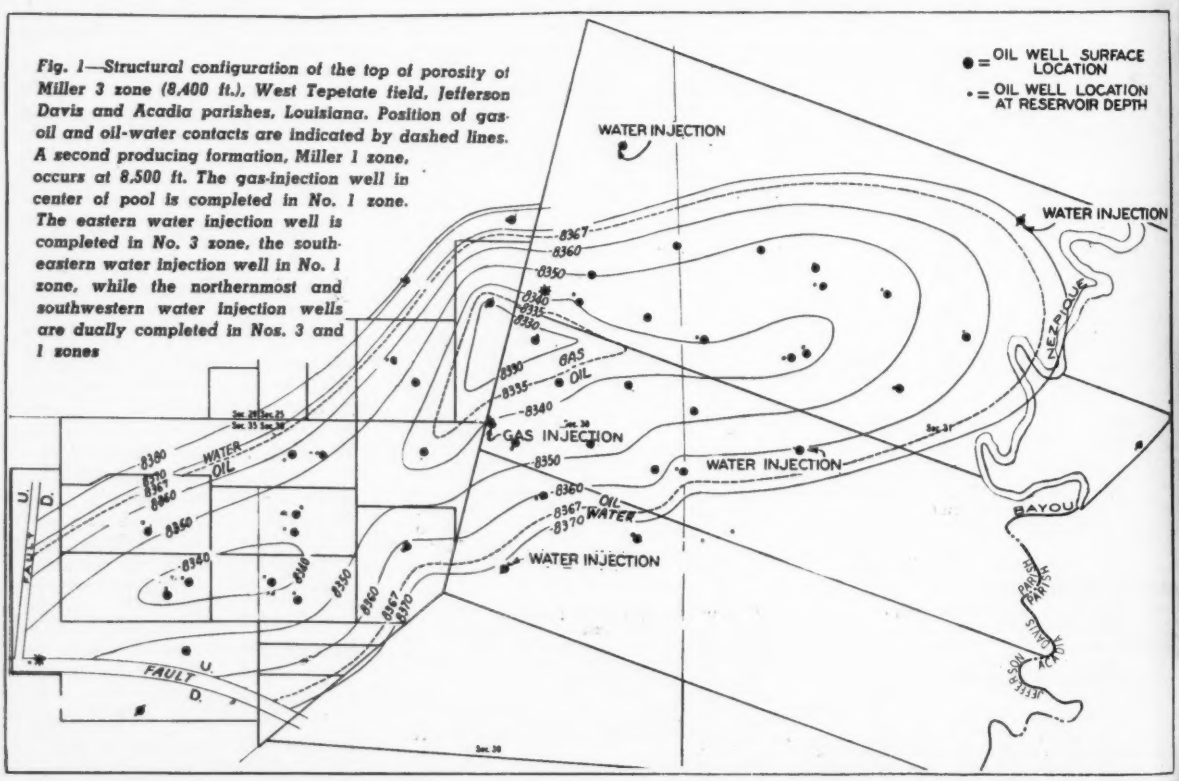

Fig. 1—Structural configuration of the top of porosity of Miller 3 zone (8,400 ft.), West Tepetate field, Jefferson Davis and Acadia parishes, Louisiana. Position of gas-oil and oil-water contacts are indicated by dashed lines. A second producing formation, Miller 1 zone, occurs at 8,500 ft. The gas-injection well in center of pool is completed in No. 1 zone. The eastern water injection well is completed in No. 3 zone, the southeastern water injection well in No. 1 zone, while the northernmost and southwestern water injection wells are dually completed in Nos. 3 and 1 zones

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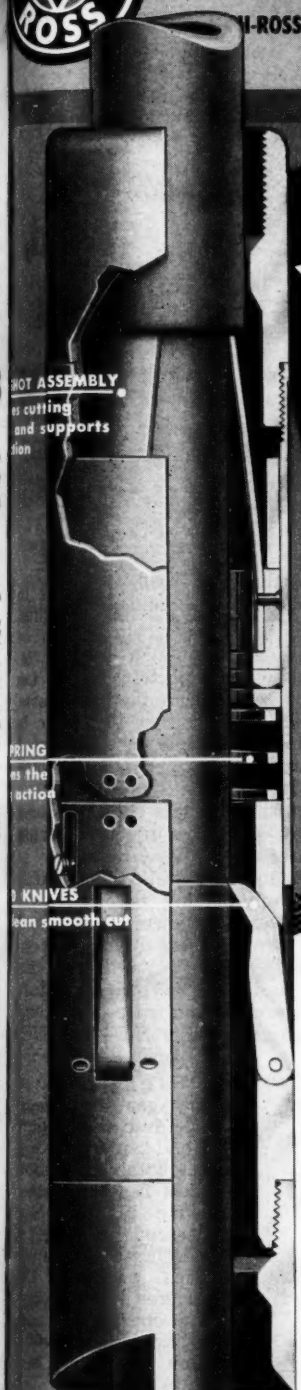

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The anticlinal structure (Fig. 1) is bounded by faults to the west and southwest and other faults exist to the northwest and north at some distance from the field. Due to these conditions the natural water influx into the field was insufficient to prevent a rapid rate of pressure decline.

The gas and water-injection wells are indicated in Fig. 1. Fig. 2 is an idealized transverse cross-section. Several of the producing wells and two injection wells have been dually completed due to the favorable reservoir conditions. At present, there are 24 wells producing from the Miller No. 1 zone and 15 wells from the Miller No. 3 zone.

The pressure and production histories of the Miller No. 3 and No. 1 zones are shown in Figs. 3 and 4, respectively. The pressure decline in the Miller No. 1 zone has been reduced, and an increase in reservoir pressure during 1949 is anticipated. The reservoir pressure of the Miller No. 3 zone is now controllable and is being increased. To date, a large volume of oil has been produced, the production of which would have been delayed without the pressure-maintenance program. In addition, the ultimate recovery will be greatly increased by largely preventing shrinkage of the oil in the reservoirs and by efficient flushing of the sands.

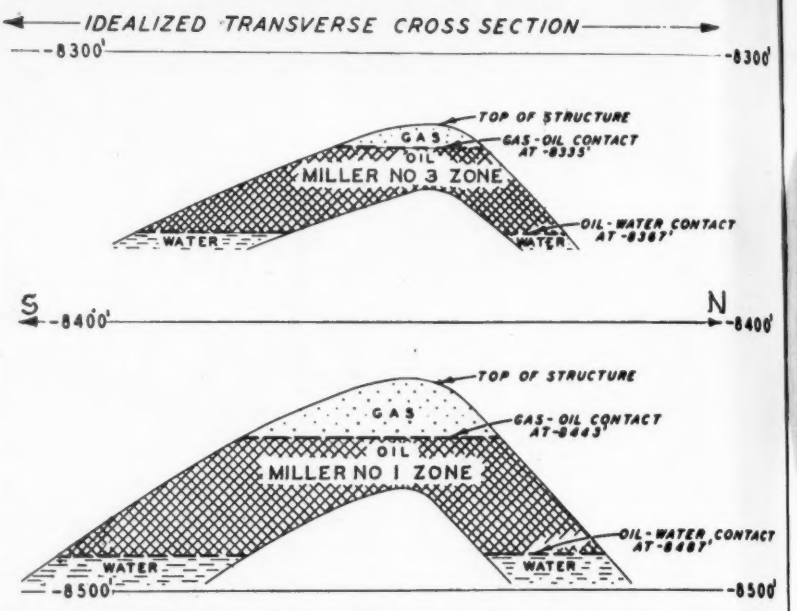

Fig. 2—Several producing wells and two injection wells have been dually completed at West Tepetate due to the favorable reservoir conditions. This cross-section shows the structural relationships of the two zones

Pressure-Maintenance Program

As mentioned in the introduction, an experimental pressure-maintenance program was instituted, with the approval of the Louisiana Department of Conservation, in June and July 1946, 24 months before field-wide unitization was effected. Water was injected into both zones through the dually completed South M. Miller No. 3 well. In July 1947 gas injection into the gas cap of the Miller No. 1 zone was commenced. These experimental injection projects demonstrated that pressure maintenance was feasible and efforts toward unitization were accelerated. Accordingly, a public hearing for the integration and unitization of the Miller No. 1 and No. 3 zones was held April 30, 1948. These zones in West Tepetate field were formally unitized by the Louisiana Commissioner of Conservation's Order No. 97-A-1, dated May 17, 1948.

Following unitization, a water-injection well was drilled north of the field and dually completed. Two additional wells have also been converted for water injection, thus each zone has three water injection wells and other edge wells can be used later if desired.

An adequate supply of salt water for injection is obtained from a sand at 2,300-ft. depth and produced water is returned to this sand through a disposal well. The injection water is kept in a closed system and is pumped to injection wells by centrifugal and reciprocating pumps. Some injection wells have zero well-head pressure while others require pressures above 1,000 psi. to inject the volumes desired. The present minimum water-injection rate is 11,000 bbl. per day for Miller No. 1 and No. 3 zones combined.

High-pressure dry gas for injection into the Miller No. 1 zone gas cap is obtained from West Tepetate gasoline plant. The present gas-injection rate is 6,000 M.c.f. per day. In future operations the operator plans to increase the volume of water in-

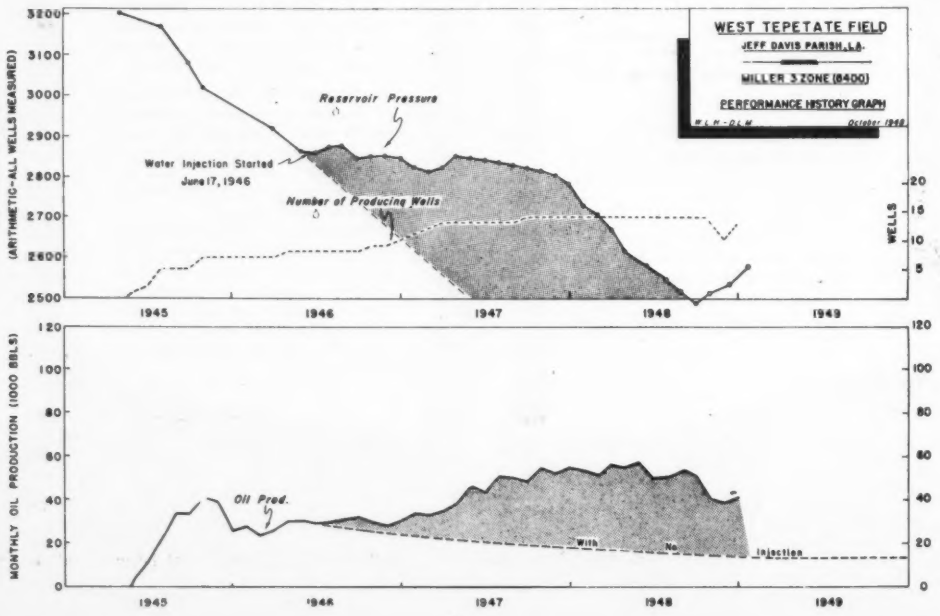

Fig. 3—Shaded areas indicate increases in reservoir pressure and oil production since water and gas injection started. Latest three reservoir pressure tests have all increased (area not shaded)

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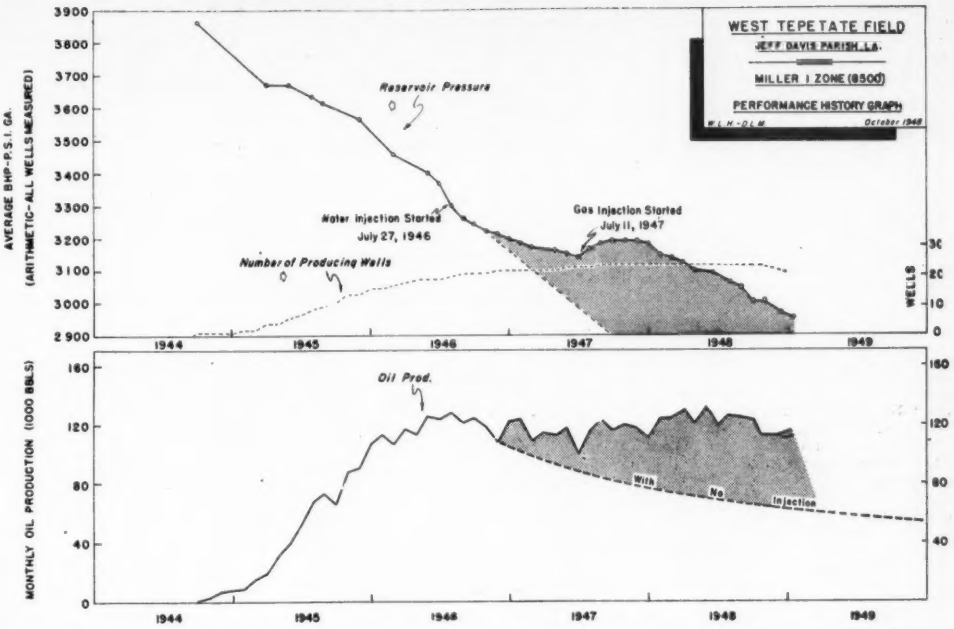

Fig. 4—Miller 1 zone (8,500 ft.).—Shaded areas indicate increases in reservoir pressure and oil production since water and gas injection started, over predicted performance by straight pressure depletion (material balance calculations)

jected and decrease the volume of gas injected.

An interesting approach to the unitization of West Tepetate was taken by Barnsdall, the largest lease owner in the field.* Because much detailed reservoir information and preliminary data were necessary to formulate a final optimum production program and for the unit itself, Barnsdall obtained these data prior to unitization. Thus, when formal application of unitization was filed with the Louisiana State Department of Conservation at Baton Rouge at a public hearing, substantial engineering evidence had been accumulated on West Tepetate for the following points:

It had been demonstrated both in the field and in the laboratory that pressure-maintenance operations would be necessary for the prevention of waste of several million barrels of oil and for the most efficient and economical production of oil and gas from these reservoirs. (The field work consisted of the actual 24-month water-injection test previously described.) The other lease owners, from these field tests, were agreed that unitization would be required to permit maximum benefits to be obtained from the pressure-maintenance program. The unitization plan

*Other lease owners included: Vincent & Welch, Inc. (Lake Charles), George C. McGhee (Washington, D. C.), E. J. Hudson and R. A. Irwin (Houston), Rycade Oil Corp., Houston, and W. T. Burton (Sulphur, La.).

TABLE 2—CALCULATION OF ACRE-FOOT DOLLAR VALUE AND FRACTION REMAINING RECOVERABLE FOR MILLER NO. 1 ZONE, OIL COLUMN

Connate water, per cent of pore space 34.0
Porosity, per cent of bulk volume 32.3

Hydrocarbon space per acre-foot of sand:
$7{,}758 \times 0.323 \times (1 - 0.340) = 1{,}653.85$ bbl.

Hydrocarbons initially recoverable per acre-foot of sand:
Contract liquid:
(Bbl. reservoir space per ac.-ft.) × (bbl. contract liquid per bbl. reservoir space) × (recovery efficiency) = $1{,}653.85 \times 0.6846 \times 0.60 = 679.3354$ bbl. contract liquid per ac.-ft.
Contract gas:
(Bbl. reservoir space per ac.-ft.) × (M.c.f. contract gas per bbl. reservoir space) × (recovery efficiency) = $1{,}653.85 \times 0.520 \times 0.715 = 614.901$ M.c.f. contract gas per ac.-ft.

Dollar value per acre-foot initially recoverable:
Contract liquid: Bbl. per ac.-ft. × \$2.60 per bbl. = $679.3354 \times \$2.60 = \$1{,}766.272$ per ac.-ft.
Contract gas: M.c.f. per ac.-ft. × \$0.03 per ac.-ft. = $614.901 \times \$0.03 = \$18.447$ per ac.-ft.
Total dollar value per ac.-ft. = \$1,766.272 (liquid)
18.447 (gas)
\$1,784.719

Initially recoverable contract liquid:
(Total ac.-ft.) × (bbl. initially recoverable per ac.-ft.) = total bbl.
$21{,}497.84 \times 679.3354 = 14{,}604{,}244$ bbl.

Fraction remaining recoverable, contract liquid:
$$\frac{\text{Initially recoverable—production to January 1, 1948}}{\text{Initially recoverable}} = \frac{14{,}604{,}244 - 3{,}466{,}656}{14{,}604{,}244} = 0.76262681$$

Fraction remaining recoverable, contract gas:
Initially recoverable contract gas:
(Total ac.-ft.) × (M.c.f. initially recoverable per ac.-ft.) = $21{,}497.84 \times 614{,}901 = 13{,}219{,}043$ M.c.f.
$$\frac{\text{Initially recoverable—production to January 1, 1948}}{\text{Initially recoverable}} = \frac{13{,}219{,}043 - 3{,}418{,}957}{13{,}219{,}043} = 0.74136125$$

TABLE 1—SUMMARY OF FACTORS USED IN EQUITY DETERMINATION, WEST TEPETATE FIELD, LOUISIANA

	Connate water (%)	Porosity (%)	Hydrocarbon space bbl. per ac.-foot sand	Hydrocarbons initially in place per bbl. res. space: Cont. liq. (bbl.)	Hydrocarbons initially in place per bbl. res. space: Cont. gas (M.c.f.)	Recovery efficiency: Cont. liq.	Recovery efficiency: Cont. gas	Hydrocarbons initially recoverable per acre-foot sand: Cont. liq. (bbl.)	Hydrocarbons initially recoverable per acre-foot sand: Cont. gas (M.c.f.)	Total ac.-ft.	Dollar value per acre-foot initially recoverable	Fraction remaining recoverable: Contract liquid	Fraction remaining recoverable: Contract gas
Miller No. 3 zone:													
Gas cap	31.0	32.4	1,734.38	0.03372	1.002	0.80	0.80	46.7866	1,390.279	180.84	163.354	0.73980768	0.73980768
Oil column	41.7	32.4	1,465.42	0.6946	0.4657	0.546	0.6382	555.7629	435.537	12,242.31	1,444.983 liq. 13.066 gas 1,458.049	0.83413543	0.73980768
Miller No. 1 zone:													
Gas cap	23.2	32.3	1,924.48	0.05325	1.156	0.80	0.80	81.9829	1,779.759	1,748.65	266.548	0.74136125	0.74136125
Oil column	34.0	32.3	1,653.85	0.6846	0.520	0.60	0.715	679.3354	614.901	21,497.84	1,766.272 liq. 18.447 gas 1,784.719	0.76262681	0.74136125

TABLE 3—TYPICAL CALCULATIONS FOR THE EQUITY PERCENTAGES FOR UNITIZATION (TRACT NO. 25-8)

Miller No. 1 zone, gas cap:
Sand volume = 19.94 ac.-ft.
Dollar value = $266.548 per ac.-ft., initially recoverable
Initial dollar value = 19.94 × $266.548 = $5,314.97
Dollar value remaining recoverable:
Initial dollar value × fraction remaining recoverable = 5,314.97 × 0.74136125 = $3,940.31

Miller No. 1 zone, oil column:
Sand volume = 1,029.08 ac.-ft.
Contract liquid dollar value = $1,766.272 per ac.-ft., initially recoverable
Initial dollar value = 1,029.08 × $1,766.272 = $1,817,635.19
Contract gas dollar value = $18.447 per ac.-ft., initially recoverable
Initial dollar value = 1,029.08 × $18.447 = $18,983.44
Dollar value remaining recoverable:
Initial dollar value × fraction remaining recoverable =
Contract liquid $1,817,635.19 × 0.76262681 = $1,386,177.33
Contract gas $18,983.44 × 0.74136125 = 14,073.59
Total $1,400,250.92

Tract No. 25-8 dollar value, all zones:

Miller No. 1 zone, gas cap	$3,940.31
Miller No. 1 zone, oil column	1,400,250.92
Miller No. 3 zone, gas cap	364.97
Miller No. 3 zone, oil column	609,760.93
Total	$2,014,317.13

$$\text{Equity percentage} = \frac{100 \times \text{dollar value tract 25-8, Miller No. 1 and 3 zones}}{\text{Total dollar value for all tracts, Miller No. 1 and 3 zones}} \quad \text{or}$$

$$\text{Equity percentage} = \frac{100 \times 2{,}014{,}317.13}{44{,}493{,}267.66} = 4.527240$$

proposed was to be on the basis of equity percentages determined by engineering methods developed from the preliminary field tests.

The information and data secured for the unitization were unusually complete and accurate, and sufficient time was allotted for the engineers assigned to complete their studies and to reach agreement on the determinations of equity percentage values for each tract. The procedure for the calculations was based on an established formula, approved by the conservation commissioner for use on many field units in Louisiana. The pattern for the unit agreement follows:

Method of Determining Equity Percentages

Surveying by registered surveyor.—A resurvey of the unit area, to locate accurately the various wells and determine the boundaries and surface acreage of the various tracts, was made by Paul J. Letz, registered civil engineer of Louisiana, and the base map was certified by him. Work maps were made from the original trace by dry ozalid process, and the ozalid reproductions were checked for accuracy by placing them over the original trace on the viewing box. The scale of the work maps was 500 ft. to the inch.

Gas, oil, and water levels.—From core-analysis data and analysis of numerous side-wall core samples, the gas-oil and oil-water contacts of the Miller No. 1 zone were found to be —8,443 and —8,487 ft., respectively. Similarly, the gas-oil and oil-water contacts for the Miller No. 3 zone were found to be —8,335 and —8,367 ft., respectively.

The depth measurements were corrected to true depths from inclinometer survey data. For the wells in which deviation from vertical had not been determined, it was assumed that the depth correction would be the average correction, which is 1 ft.

On the maps, the location of the well bore at the elevation of the pay was indicated for each well by the small dot near the surface location.

Structural maps.—Tops of the Miller No. 1 and Miller No. 3 zones were determined from the electric logs, and contoured on large-scale base maps, using the horizontal and vertical corrections mentioned above. The outer productive limits of each sand were determined to be at the intersections of the oil-water contacts with the top of effective porosity. Thickness of net permeable sand, measured to the nearest foot in each well for the two zones, was determined from the electric logs. The producing formations were cored in a number of wells over the field, and the information obtained was utilized in the interpretation of the electric logs.

Sand - volume determination. — Net sand isopachous maps were prepared by contouring on the sand thickness for each well. The inner line of water underlying the sand was determined from the appropriate contour of the under part of the pay section. The net oil-sand isopachous maps are identical to the net sand maps in the areas which are neither underlaid by water nor overlaid by gas. In the gas-cap areas, the gas-sand thicknesses were subtracted from the net sand to obtain the oil-sand thickness.

Each productive tract was planimetered to compute the volume of pay sand in acre-feet. In operating the planimeter on these maps, the horizontal dividing plane method was used, thus providing the maximum accuracy for measuring each interval of thickness contoured. Where the ratio of successive decreasing areas was greater than 0.5, the trapezoidal formula was used in computing acre-feet. Where the ratio of successive areas was less than 0.5, the pyramidal formula was used. In computing the volume overlying the horizontal plane passed through the largest valued contour line on a tract, either the pyramidal or trapezoidal formula was used, depending upon the shape of the tract. The planimeter was calibrated on each tract using the known acreage as determined in the resurvey.

Recoverable production.—In addition to the acre-feet of productive sand, data and factors required for the calculation were porosity, connate water saturation, production efficiency expected, production to January 1, 1948, and physical characteristics and fractional analyses of reservoir fluids. The essential factors are listed in Table 1.

The porosity values are the average of all samples having permeabilities greater than zero in the particular zone. The connate-water-saturation values were obtained by the restored-state method of capillary pressure-saturation measurements.

In the equity percentage determination, the definitions of oil and gas and their values are: The unit-operation agreement contract liquid is considered to be 80 per cent of butanes and all heavier hydrocarbons; the contract gas includes 20 per cent of the butanes plus all lighter hydrocarbons. One subsurface sample of reservoir fluid was obtained before commercial production was started; additional tests were made on a recombined sample. The volumes of contract liquid and gas per barrel of reservoir hydrocarbon space were calculated. These procedures were done for both zones.

Initially recoverable reserves.—These are considered to be 60 per cent of the oil initially in place for the Miller No. 1 zone. Laboratory test data and production data from fields having strong water drives indicated this should be a reasonable value. At time of discovery, the reservoir pressure of the Miller No. 3 zone was approximately 600 psi. below the normal pressure for that depth. Reservoir performance indicates that expansion of the reservoir fluids had occurred prior to discovery, increasing the hydrocarbon volume 7 per cent by release of dissolved gas. Since the residual-oil saturation in the sand after flushing with water would be essentially the same whether preexpansion had oc-

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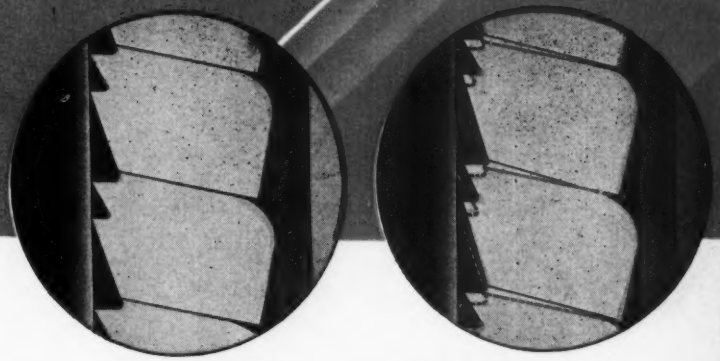

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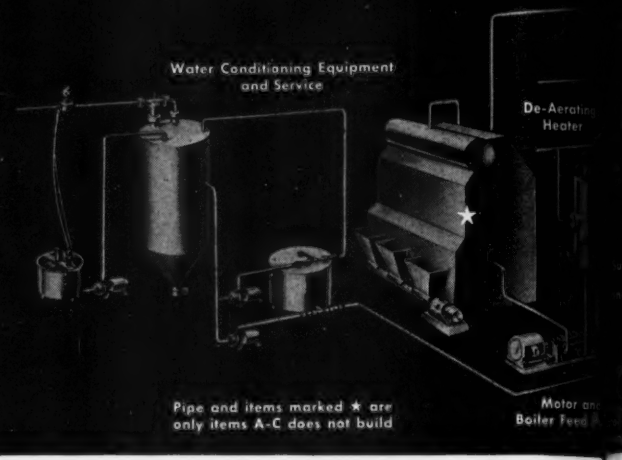

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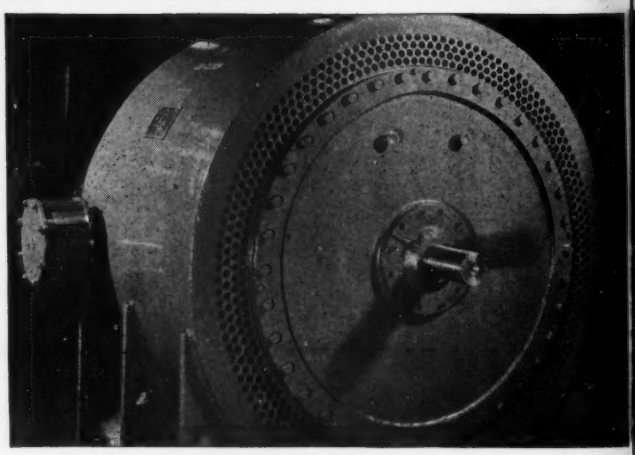

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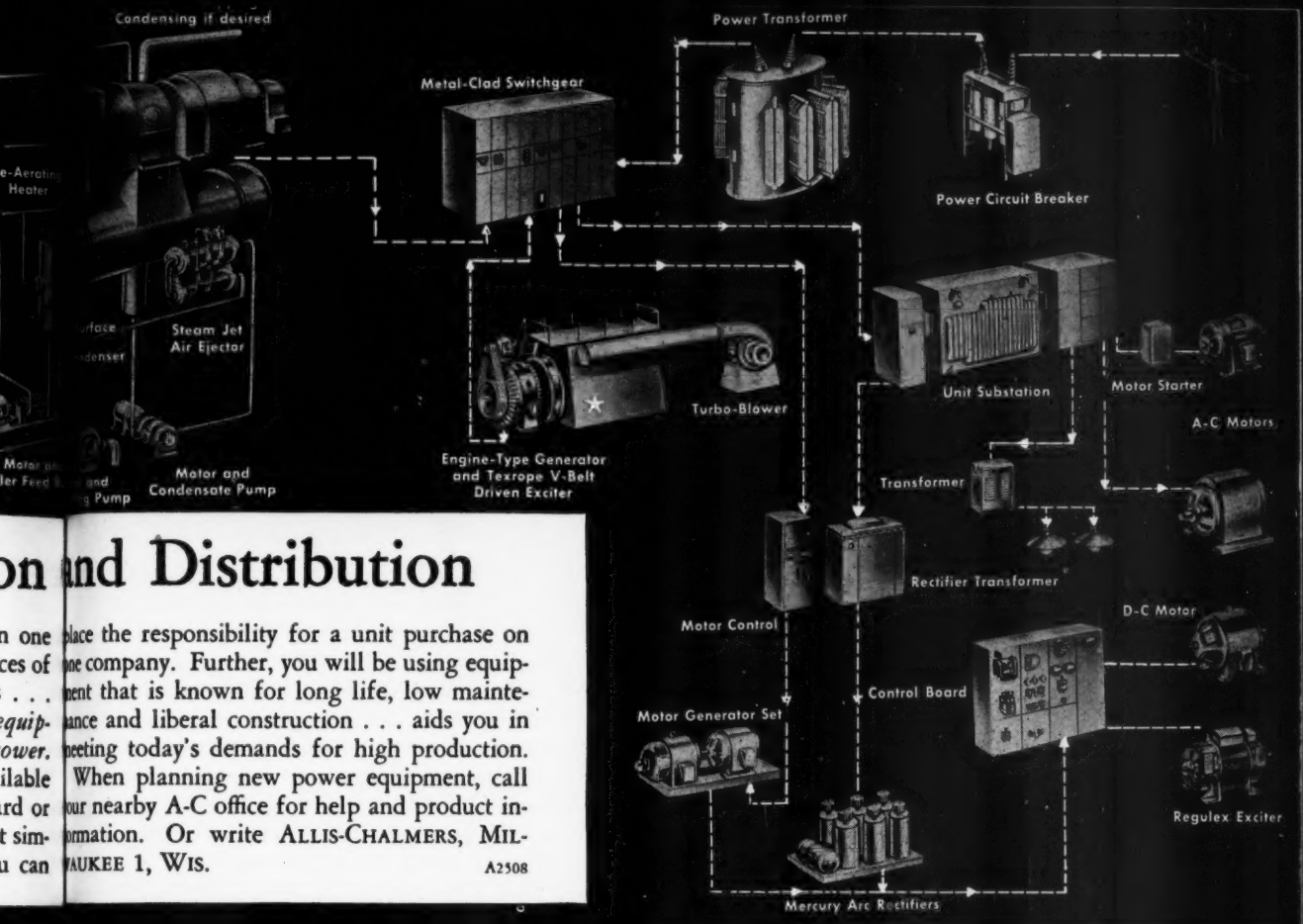

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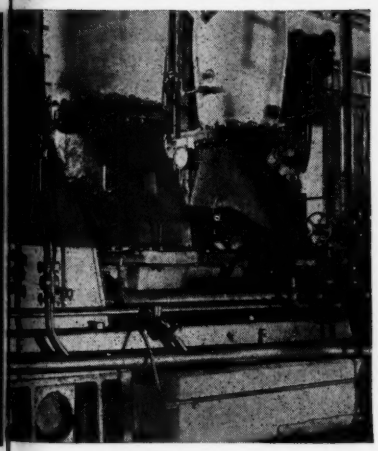

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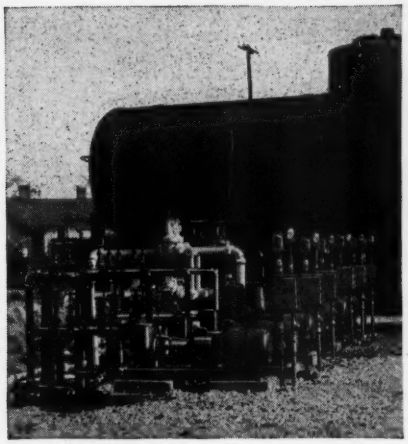
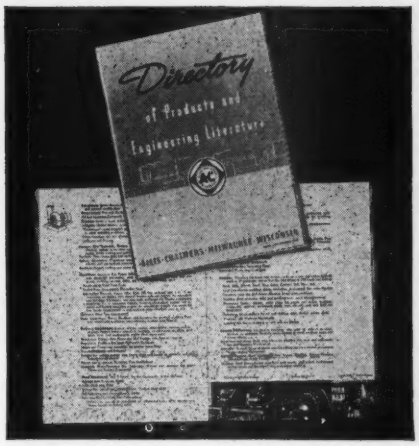


FOR PUMPING GASOLINE, WATER and other liquids, A-C can supply pumps in many types and sizes. Included is the Self-Priming unit, popular for loading and unloading tank cars, barges, etc. because it maintains pumping action even when slugs of air or gas are admitted.



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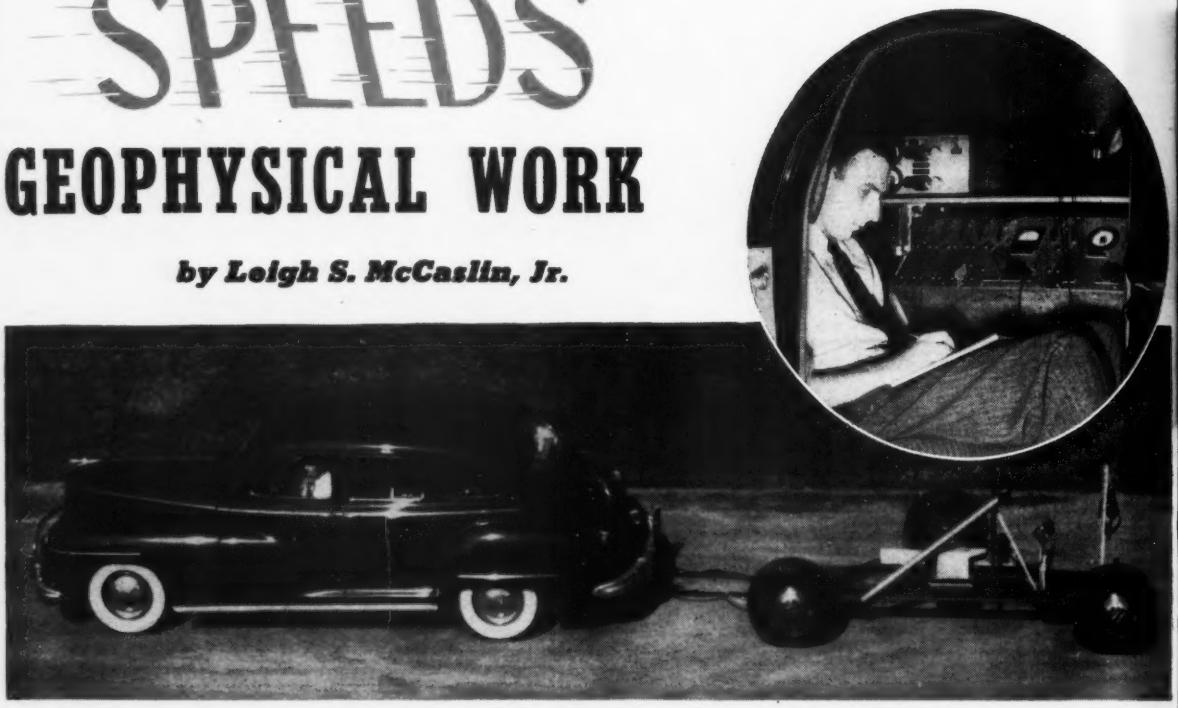
XUM

New Car-Mounted Surveying Instrument

SPEEDS GEOPHYSICAL WORK

by Leigh S. McCaslin, Jr.



This car and trailer are moving at 20 m.p.h. establishing field elevations. When an elevation is desired, the two-man crew stops car and takes a reading on a meter mounted in the back seat. Inset shows operator, in back seat of sedan, taking readings at points where elevations are desired. The electronic calculator in picture computes the change of elevation 500 times for each foot of road traveled

A NEW car-mounted surveying instrument, which can cover as much as 60 miles per day, is now at work in the Texas Gulf Coast area establishing elevations for field geological and geophysical crews.

This unusual instrument measures differences in elevation between any points which can be reached by automobile. Elevation readings may be obtained at any point along the car's route. The car can travel at speeds in excess of 20 m.p.h. without affecting the accuracy of the readings. By the time-honored method of determining elevation differences on foot with a level and rod, 8 miles of coverage a day is a good pace, for average terrain.

The accuracy which can be obtained (within a foot or less in several miles of traverse) is sufficiently high to be useful for many purposes. Oil-industry uses which have been foreseen at this early date include: (1) to establish elevations for station sites in geophysical prospecting with gravity meter or seismograph, (2) for vertical control for surface geological surveys, and (3) for vertical control for aerial topographic surveys.

Coinventors of this new instrument are Ford L. Johnson, manager, and Fred M. Mayes, research physicist, of Sun Research & Development Department at Newtown Square, Pa. It has been dubbed the "elevation meter" by its inventors and will be available to the oil industry on a service basis through Sperry-Sun Well Surveying Co. Three of the units have been built to date and others are currently under construction.

One elevation meter has been working in Alabama and Mississippi since last October for the U. S. Geological Survey to obtain vertical control for aerial surveys to be used in constructing topographic "quadrangle" maps.

Principle of Operation

The principle of operation of the elevation meter has been explained by F. L. Johnson, a coinventor, using Fig. 1. By elementary trigonometry, the height "h" is equal to the length "l" multiplied by the sine of the angle of elevation, theta. At (b) is a vertical profile of a roadway showing similar triangles for a constant incremental length. The total change in elevation (H) may be expressed as the sum of the incremental lengths multiplied by the sine of the elevation angles.

In terms of velocity, "H" becomes

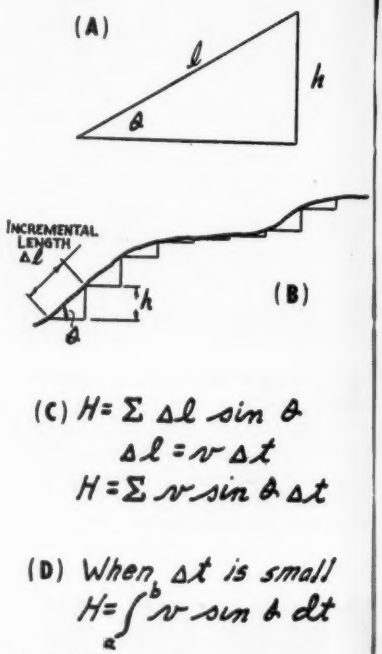


Fig. 1—This diagram explains the principle of operation of the elevation meter, which is explained in the text

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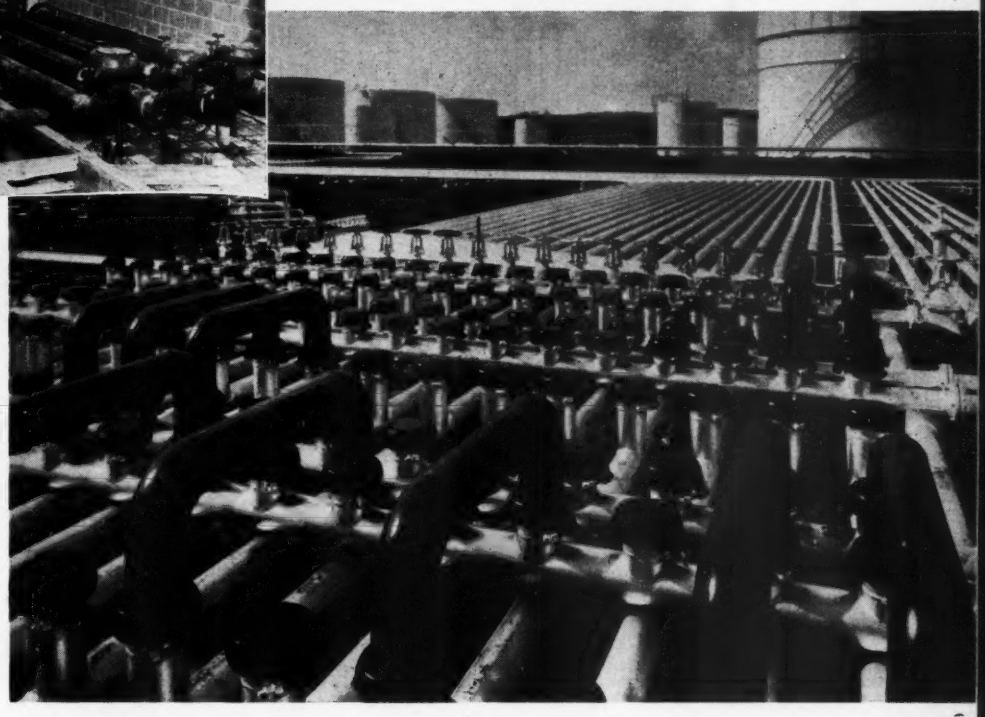
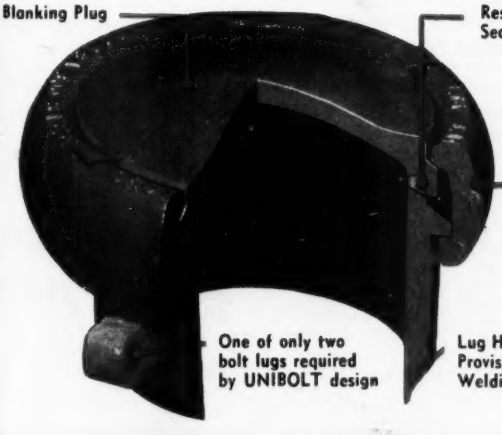
UNIBOLT PIPELINE TERMINAL FITTINGS



Top—Original installation in 1945.

Right—Latest installation in 1947.


Blanking Plug
Resilient Seal Ring
Nut, or Holding Member
One of only two bolt lugs required by UNIBOLT design
Lug Hub—Provisioned For Welding To Pipe

The above cut-away view of a UNIBOLT Pipeline Terminal Fitting illustrates its simple yet unique design. Tapered interlocking shelves on the lug hub and holding members are drawn together by means of only two bolts to apply tremendous pressure on the seal ring.

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Pipeliners are invited to write for UNIBOLT Bulletin PL-490, which illustrates a number of time, labor and cost saving applications of UNIBOLT products.

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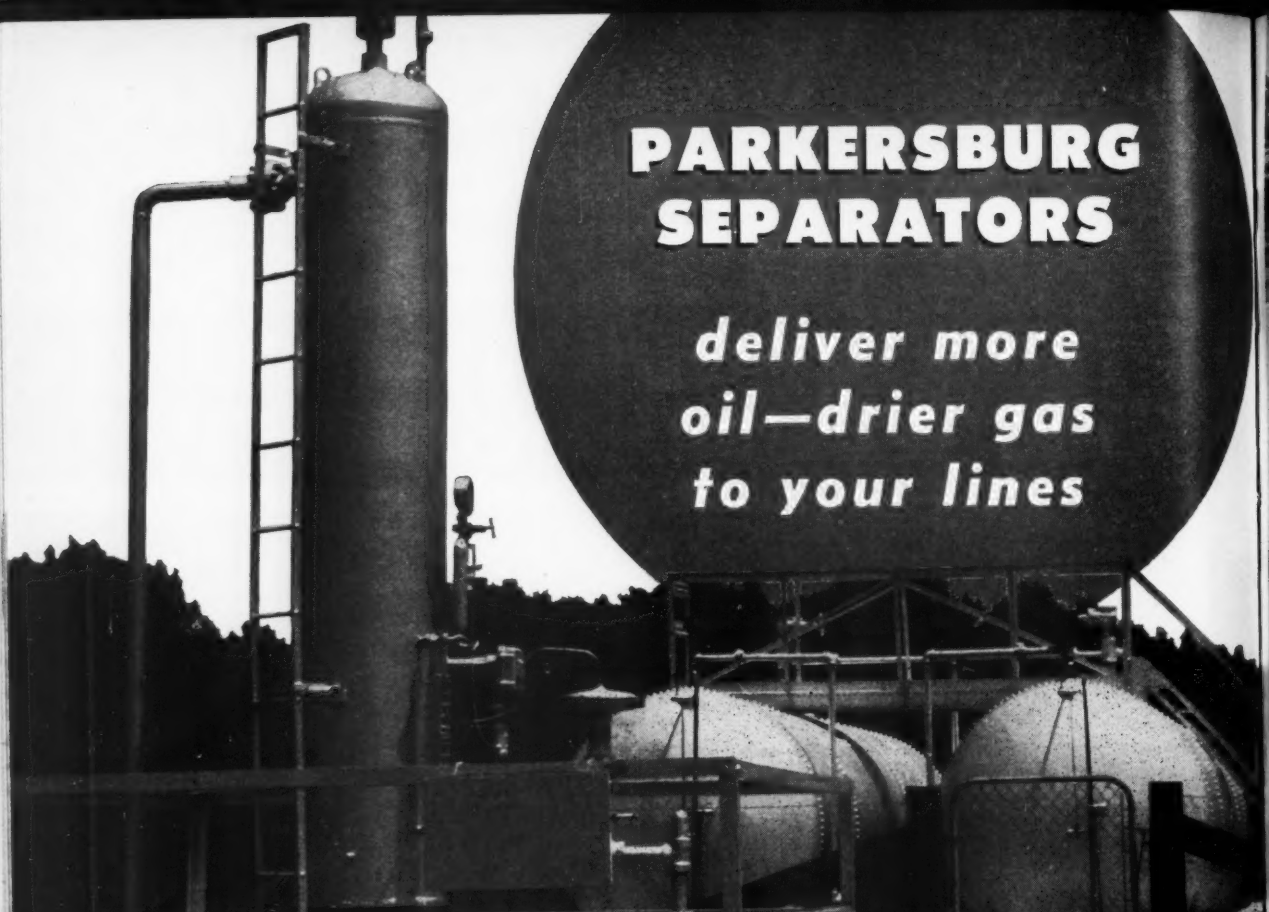

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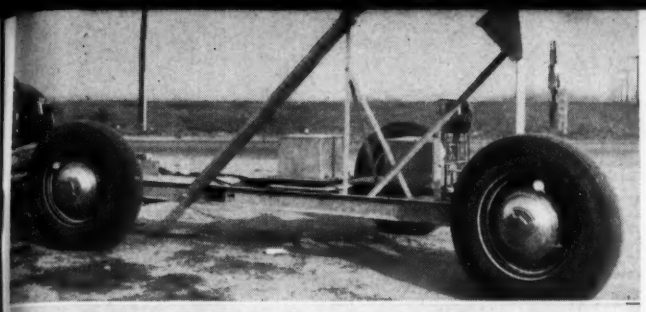

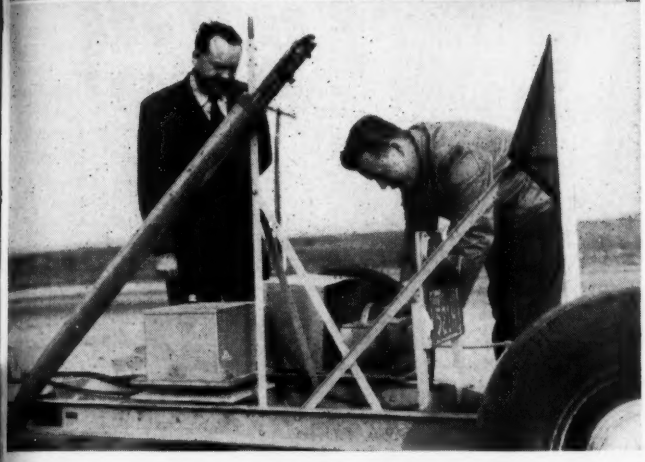

Top: Closeup of trailer unit which is towed behind automobile. Front and rear wheels follow the same path to eliminate errors in readings of instrument. In the view immediately above, Ford L. Johnson and Fred M. Mayes, coinventors of the elevation meter, check an adjustment on the velocity generator mounted on the trailer of the instrument. Picture was taken near Houston on a recent trial run

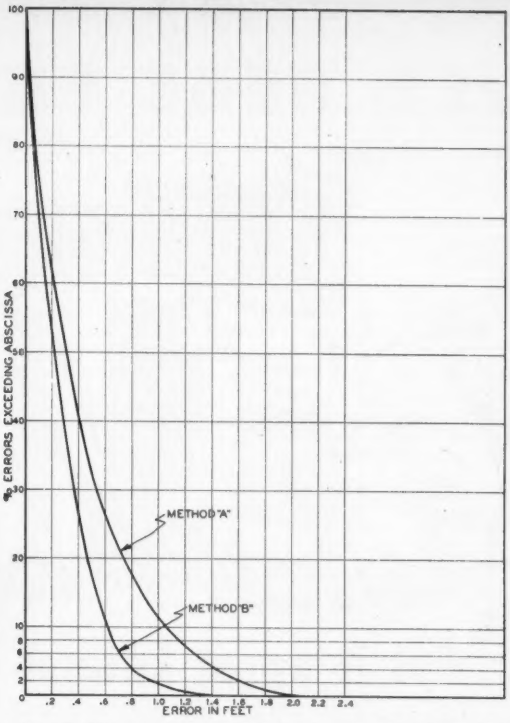

Fig. 4—The curves here depict the error distribution of elevation meter readings obtained on a trial course. The course was run using two different methods as shown by the two curves—Method A and Method B. Sample reading: For a course run using method of operation "A," only 40 per cent of the readings will have an error in excess of 0.4 ft.

the summation of the products of velocity, the sine of the elevation angle, and the time required to traverse an incremental length. When the time increment is small, the difference in elevation becomes the integral of V sin θ dt. An instrument to accomplish this result must have the following elements:

1. Means to obtain an output signal proportional to the sine of the angle with the horizontal. The angle-measuring device must respond only to changes in longitudinal inclination and must be insensitive to changes in the transverse angle.
2. A device whose output is proportional to the velocity.
3. Means to evaluate the integral V sin θ dt.

Fig. 2 and the accompanying photographs show the composition of the elevation meter. The automobile contains the electronic integrator, the source of regulated d.c. power and the relay-operated mechanical counter on which is shown the elevation. The counter is arranged to indicate changes of 1 ft. Tenths of feet are read on an auxiliary electrical meter. The power source is a d.c. system driven by the automobile engine.

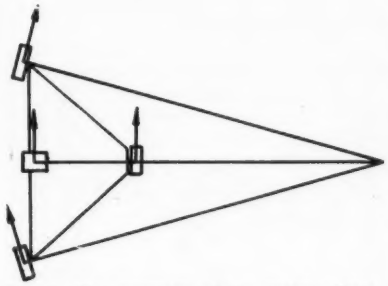

Fig. 3—The geometry of the unique three-wheel trailer is illustrated. Front and rear wheels are interconnected and both turn together. The pendulum, which reacts to changes in elevations, is mounted intermediate between the two steerable wheels

Mounted on the trailer frame are the velocity generator, driven by a flexible coupling from the rear wheel, and a pendulum unit which gives an electrical output. The angle with the horizontal is measured over a base length equal to the distance between the front and rear wheels.

The electronic integrator computes the change of elevation 500 times for each foot of road traveled. The pendulum registers whether the change in elevation is upward or downward. These changes are transmitted from the pendulum to the integrator as "plus" for upward values or "minus" for downward values and added by the integrator. Thus at any time the automobile is stopped a meter reading will show the change in elevation since the car left its starting point or base elevation.

Experience to date indicates that the best method of operation depends on the individual area being surveyed. Among the factors affecting the method of operation are: the road density, availability of bench marks, and the accuracy requirements established by the user of the survey. A crew of two men is presently being used to operate the instrument.

The design of the towed trailer used

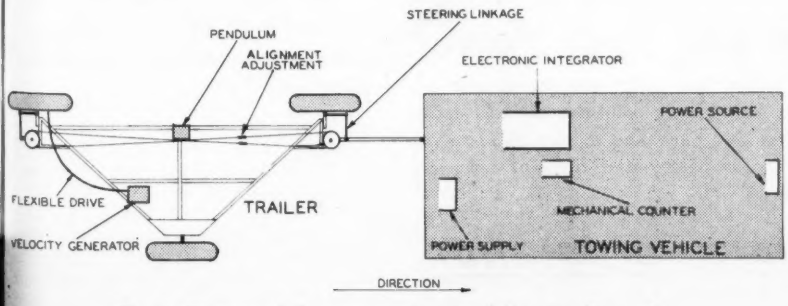

Fig. 2—Diagram of the component parts of the elevation meter

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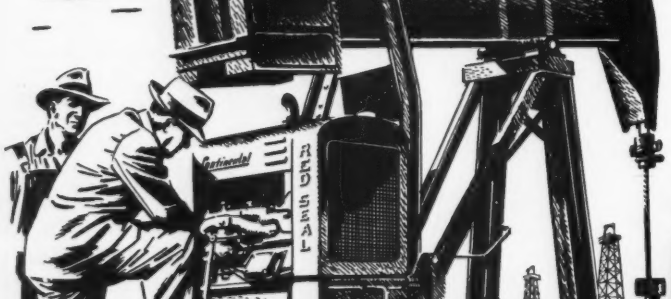

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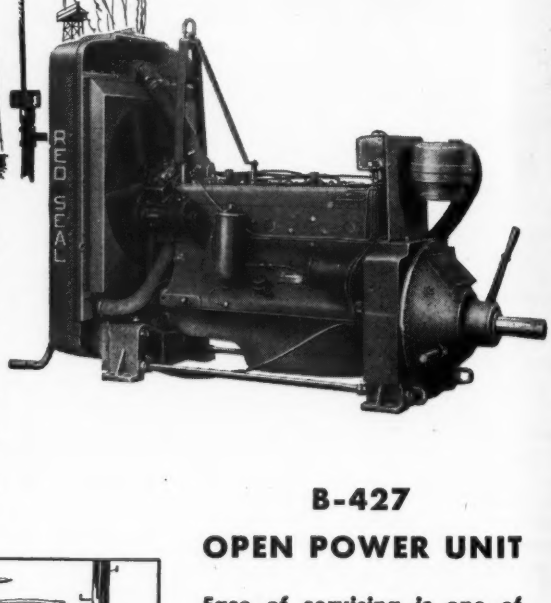

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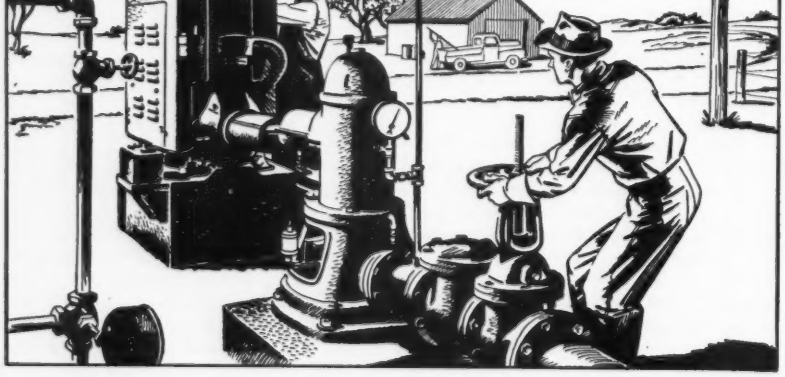

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Reliability in 24-hour-a-day service is another factor you are assured of, when you select Red Seal engines for pumping or any other oil field application. And there's a nationwide Red Seal parts and service organization to keep your equipment running. Free oil field engine bulletins are yours for the asking . . . write for them today.

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OPEN POWER UNIT

Ease of servicing is one of the features designed into this 6-cylinder L-head engine, which delivers up to 70 h.p. on natural gas. Tappets, for example, can be lifted out and quickly replaced through the valve chamber. It is not necessary to drop the oil pan and pull the camshaft. You obtain the efficiency of L-head power with the ease of servicing typical of overhead valve designs. Ask for free oil field bulletin PB-47427.

Continental Motors Corporation

MUSKEGON, MICHIGAN

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for the elevation meter is of interest. The requirements for any trailer system, as set up by the inventors, were:

1. The instantaneous direction of the trailer must be in the plane of the pendulum's motion.

2. The speed measured must be the speed at which the pendulum is moving.

Fig. 3 illustrates the geometry used in the trailer system, wherein the front and rear wheels are interconnected and both turn together. The pendulum is located at the immediate position between the two steerable wheels. At this point, its motion is always at right angles to the turning radius, thus fulfilling the first requirement. Its location does not completely fulfill the second requirement, but it has been established that the error in the velocity measurement is insignificant. Other considerations in the trailer design are:

1. In a rigid construction the three-point support must be used to insure contact of both measuring wheels with the roadway.

2. The front and rear wheels, which establish the base length for measurement, must follow the same path if errors due to transverse road slope are to be avoided.

3. The pendulum must have its plane of motion parallel to the direction of tow to avoid errors due to transverse slope. The proper azimuth orientation for the pendulum is determined empirically by raising and lowering the third wheel and turning the pendulum until no effect is noted.

Error-Distribution Curves

In Fig. 4 are shown curves depicting the error distribution of elevation meter readings on a trial survey which covered 325 miles of road and established elevations at 1,150 stations. Meter readings were checked with known elevations determined by precision spirit leveling. The average spacing between points of known elevation for this particular area was 5 miles. Two different methods of operation were used in running the survey. These are labeled "method A" and "method B" on the drawing.

A sample reading for method A is as follows: For a course run using method of operation "A" and with bench marks 5 miles apart, only 40 per cent of the readings will have an error in excess of 0.4 ft. On the same curve, it can be seen that only 10 per cent of the readings will have an error greater than 1.03 ft.

The meter error is random and is proportional to the square root of the distance. From this, the error distributions for other spacings of known points of elevations may be determined readily. If the spacing is increased to 10 miles, for example, the abscissa values of the error curves shown in Fig. 4 will be multiplied by $\sqrt{10/5} = 1.41$. Thus for a 10-mile spacing, 10 per cent of the errors will exceed 0.9 ft. (0.62 × 1.41) for method B.

When readings are taken over a network of roads, permitting distribution of errors according to standard practices, the accuracy is materially increased.

For a previous article on the subject of speedy measurement of elevations, see The Oil and Gas Journal, August 9, 1947, page 86.

General Petroleum's Burrel Gasoline Plant

(Continued from page 70)

sure dry-gas scrubber and drip pot are also connected to the 35-psi. pressure dry-gas scrubber.

The condensate from the 450-psi. pressure wet-gas scrubber, after compression and cooling, is piped to the 150-psi. pressure wet-gas scrubber where it is flashed. The condensate from the 150-psi. scrubber is further flashed into the 35-psi. recycle scrubber. From the 35-psi. pressure recycle scrubber the clean condensate is taken into a 6-ft. diameter by 20-ft. clean condensate storage tank.

In case the 150-psi. pressure condensate turns up dirty in color, it can be alternately flashed into the 50-psi. wet-gas scrubber where it then goes to the dirty drip tank. The clean and dirty drip tanks are good for 30-psig. pressure. Vent vapor from these two storage tanks is connected to the stack to air line and to the boiler-plant fuel line. Pressure is maintained by means of a back-pressure regulating valve.

The clean drips are pumped from the clean drip condensate storage tank by means of a horizontal duplex steam pump into the reflux line to the fractionating still. The dirty drips are pumped from dirty drip storage tank by means of a similar pump to the oil-conditioning unit heater.

Oil-Conditioning Unit

The oil-conditioning unit has to serve two purposes, cleaning up dirty absorption oil, and recovering absorption oil and gasoline from the dirty drip condensate. The unit consists of a vertical-tubed fire-type heater. The vapors out of the heater are connected to a tubular condenser mounted on the top of an accumulator.

The dirty absorption oil is taken from the base of the fractionating still to the heater. The oil-conditioning heater has an evaporating capacity around 5 p.p.m. at 450° F. temperature. The overhead vapor line from the heater is laid to grade to the condenser which in turn is liquid sealed by the accumulator tank which is placed immediately underneath the condenser. This causes a vacuum on the heater by the condenser. A vacuum of 10 in. of mercury is the optimum pressure for this type of unit.

When the dirty drip condensate is reclaimed it is pumped from the dirty drip tank to the heater. The liquid is pumped from the accumulator to the storage tanks, or to the fractionating still, or to the rich oil into the reabsorber. The oil-conditioning unit is operated alternately for reclaiming dirty drips and for reclaiming dirty absorption oil. The accumulated heavy-gravity black oil that accumulates in the base of the heater has to be drawn at quite frequent intervals in order to prevent coking up the heater. When to draw this oil can be determined by gravity or by the fact that as the material gets heavier the temperature has to be increased in order to maintain a proper leave and a maximum temperature can be set for withdrawal of this oil when it has been reached.

It is expected that when the volume of dirty drips exceeds the capacity of the unit, it will be necessary to install a reclaiming still. This type of reclaiming or oil-conditioning unit was installed at the recommendation of the operating department. It does not have the facilities, however, for making controlled molecular weight oil. It merely cleans the absorption oil and removes the real heavy fractions.

Compressor Station

The compressor station consists of two Clark two-cycle 400-hp. gas-engine compressor units which were moved from another corporation gasoline plant; three Clark two-cycle 500-hp. gas-engine compressor units; two gas-engine-driven and one steam-turbine-driven engine circulating water pumps; starting air compressor and instrument air compressor both gas-engine driven; and two additional bays of building for parts storage and for overhaul and for maintenance work.

In deciding the layout for the compressor station certain quantities of gas were selected from the field data, together with the gas analysis and the process calculations the plant layout was selected. From these data the compression ranges and capacities selected are observed to be: 3,600 M.c.f. of 45-psi. pressure wet gas to be compressed to 155 psi. pressure designated as gas A; 14,100 M.c.f. per day of 150-psi. pressure wet gas to be compressed to 460-psi. pressure designated as gas B; 14,000 M.c.f. per day of 450-psi. pressure dry gas to be compressed to 600-psi. pressure designated as gas C; 1,500 M.c.f. per day of 35-psi. pressure-still vapors to be compressed to 160-psi. pressure designated as gas D; and 7,325 M.c.f. per day of propane gas for refrigeration from 70 to 165-psi. pressure or from 55 to 165-psi. pressure range designated as gas E.

The total horsepower for compression that is represented by these fig-

ures is approximately 1,800 to 1,870. About the time the layout was decided it was further requested to increase the 50-psi. pressure wet-gas quantity to 6,000 M.c.f. per day and to provide 100 per cent spared capacity for the 450 to 600-psi. compression service or gas C.

In laying out the compressor station provisions were made so that in case of an engine shutdown, the load could be shifted to load completely the remaining units in operation, and in case there was an excess quantity of wet gas it could be processed through the 150-psi. pressure absorber and allowed to go to air if necessary. Final arrangement of the compressor unit sizes was selected on this basis, remembering that we are operating two-cycle gas engines which should be operated under a full load condition in order to obtain the best operation.

Induced-Draft Cooling Tower

Preliminary weather investigation revealed periods as high as 30 days with very little wind available and at the same time wet bulb temperatures as high as 72° F. Also it was found that ground fogs due to irrigation at certain times of the year caused high wet-bulb temperatures and high humidity conditions. This data led to the consideration of the installation of an induced-draft cooling tower.

A study of various designs led to the installation of a Water Cooling Equipment Co. 24-bay, 6-cell cooling tower. The 20-ft.-long atmospheric cooling sections are arranged so that they may be stacked four high in the base of the cooling tower. The rating on the tower provides for cooling 7,200 g.p.m. of water from 100° to 80° F. with a 72° F. wet-bulb temperature. This represents 0.4 in. of water draft in the entrance of the fan duct which equals a fan velocity of approximately 302 ft. per minute.

Design features in this tower include:

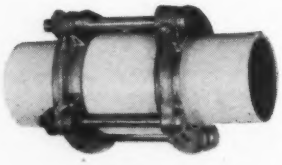
1. Six stainless-steel fan blades installed in each cell.
2. Fans are driven by a Waukesha gas engine through a 5-to-1 Western gear.
3. Drift eliminators to prevent water from being carried from the tower.
4. Removable cooling-water decks of sufficient strength to permit removal for cleaning and hosing off.
5. Vapor stack with damper, installed vertically from the atmospheric cooling section through the drift eliminators to permit the removal of hot water vapor.
6. Double outside ventilated wall construction.
7. Pickup and redistribution system with water control levers carried down so as to be operable from the ground.
8. Special hot-water control arrangement on certain cooling sections; i.e., cooling gas that has to be maintained above 60° F. to prevent the formation of hydrates.
9. Alternate spacing of coils with passageway between to permit easy access for cleaning.
10. Stacking of atmospheric cooling sections with cold services above hot services so as to economically permit the flow of sufficient water over the coils in order to reduce scaling tendencies.

Fractionating Unit

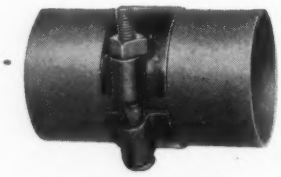
The fractionating unit was designed to produce stabilized 18 to 26-lb. R.v.p. gasoline, liquid propane, and a mixture of butanes for further mixture with propane, to make an L.P.G. product. Flow in this section is the conventional arrangement in which the raw gasoline is depropanized in the first column with the bottoms from this column feeding the debutanizer column. (See Fig. 4.) In the debutanized column the stabilized gasoline is drawn from the bottom of the column and L.P.G. product is taken overhead. The vent gas from the depropanizer reflux accumulator may be taken to field fuel or to the 150-psi. pressure absorber as desired. Any vapor from the debutanizer reflux accumulator is taken to the recycle scrubber and reprocessed.

The bottom temperatures of these columns are controlled by the temperature of some plate in the column below the feed plate, or several plates up from the bottom of the column as determined experimentally in the field.

The depropanizer column has ten more fractionating plates installed than are normally required for this type of column. The purpose of these plates is to permit the withdrawal of propane having approximately 99 per



COLLAR CLAMP
Styles 4 and 41, for repairing and preventing leaks through threads of screw collars.



BAND CLAMP
Style 77B, for repairing small leaks and holes in the run of pipe.

FIX LEAKS-without shutting down

Keep line contents moving while you stop leaks. Just put a Dresser Repair Clamp around the leaking pipe and tighten the bolts. Dresser Grade 29 Gaskets offer you special advantages for a permanent leak-proof seal.

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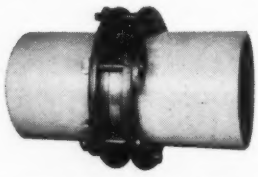
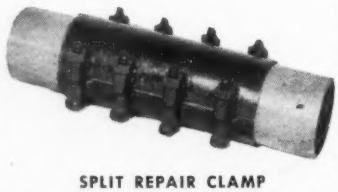


POROUS-WELD CLAMP
Style 55, for repairing circumferential weld leaks.



SPLIT REPAIR CLAMP
Style 79B, for repairing pitholes and longitudinal splits in pipe.

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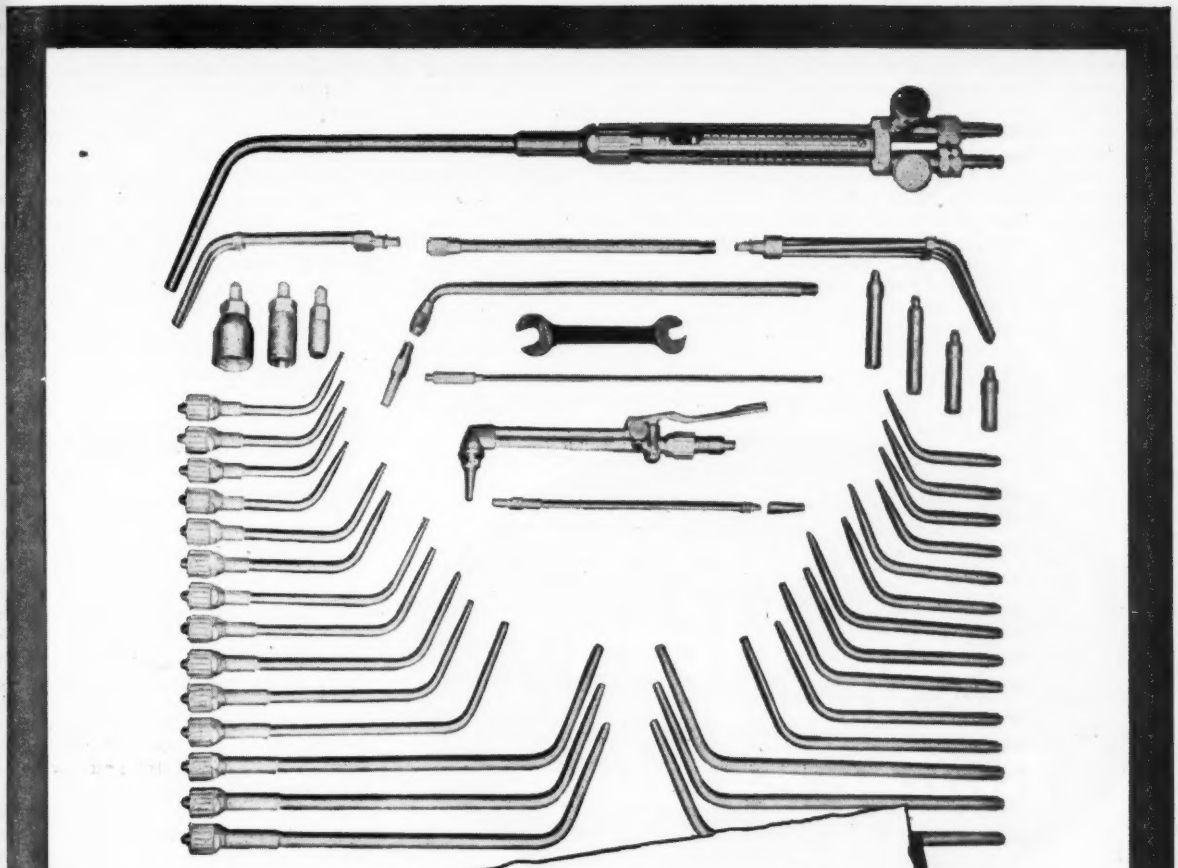

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cent purity at from 6 to 10 plates below the top plate. By using a large reflux accumulator and overrefluxing the column maximum withdrawal of the propane content can be accomplished. Connections have also been installed so that a stripper operation could be installed later for a continuous removal of the maximum per cent of the propane content having a 98-99 per cent purity.

The fractionating plates installed in this depropanizer column are specially designed by the writer and C. F. Braun Co. engineers. A balanced vapor and liquid design has been used which permits a higher maximum capacity than usually found in 48-in.-diameter columns. This design permits a considerable larger number of bubble caps to be installed than are usually found in conventional designs.

The stabilized gasoline from the debutanizer column is piped from the column through a reboiler, feed heat exchanger, atmospheric cooling in the induced-draft cooling tower, and to the storage tanks. The heat exchanger delivers heat to the raw feed gasoline on its way to the depropanizer column.

Horizontal duplex steam pumps used for feed and for reflux are rate controlled. A throttle valve placed in the discharge line from the pump provides the necessary pressure drop, which varies with the rate, for controlling the steam to the duplex pumps. This practice is found to avoid pulsation troubles that are found to give trouble with the conventional rate control method.

Bechtel McCone Corp. prepared the necessary drawings and constructed the gasoline plant under the direction of General Petroleum Corp. engineers. Similarly Pacific Pipe Line Construction Co. installed the field gathering system, including the gas booster compressor stations. M. E. Garrison was project engineer for General Petroleum.

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Measuring Oil-Pool Performance

(Continued from page 77)

cific West Edmond porosity) compares closely to Littlefield's estimate. The initial observed pressure decline of 161 psi. (5.2 per cent) on March 15, 1944, indicated a recovery of 6,500 bbl. per pound square inch pressure decline or a V = 940,000 acre-ft. There is a discrepancy in the results because the pool was not completely explored on this date; and owing to low permeability and porosity, pressure behavior of the producing wells was not representative of the reservoir.

C. Estimated drainage between a leasehold and an oil pool under depletion control.

While material balance calculations during early stages of depletion at best are only rough approximations, use of the Y factor can give much the same result with less basic data.

Given: Leasehold "A" known to be situated in a depletion-type reservoir:

$V = 10{,}000$ acre-ft. for leasehold

$R = 2{,}000$ M. bbl.

$\Delta P = 1{,}000$ psi.

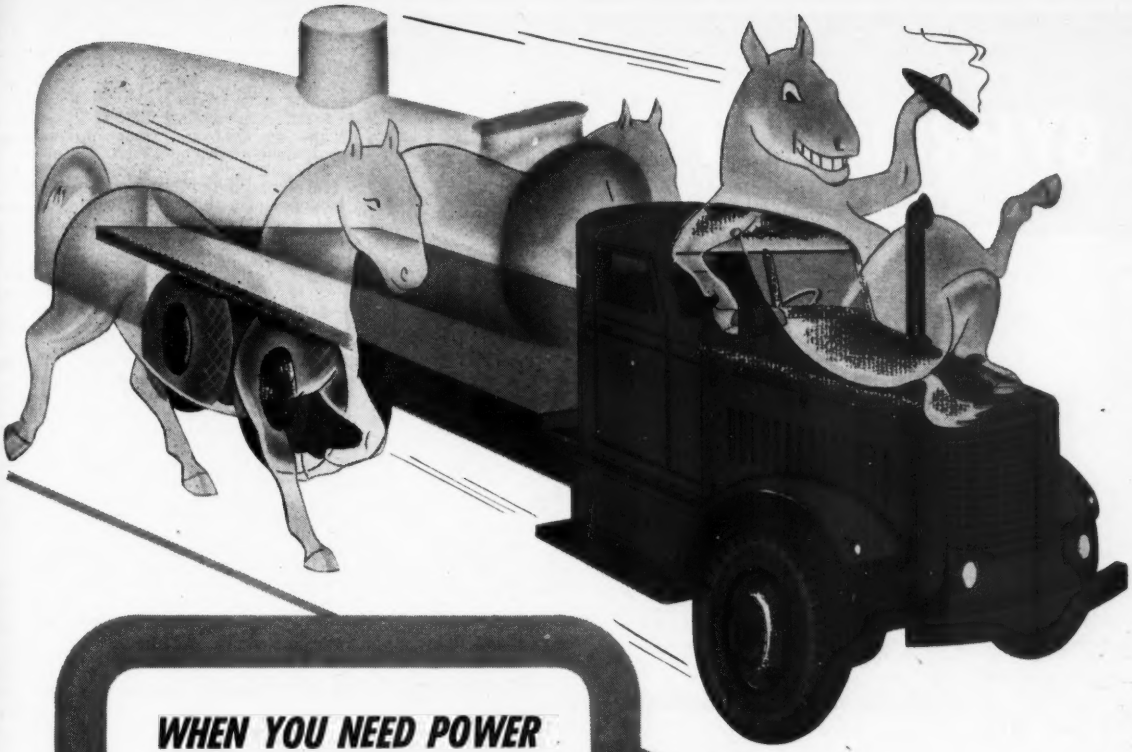
$$Y = \frac{2{,}000{,}000 \times 1{,}000}{10{,}000 \times 1{,}000} = 200$$

This result indicates that in all probability there has been oil migration toward the leasehold from the remainder of the reservoir, because Y should be in the order of 70. Cumulative oil recovery should normally have been only 700,000 bbl. which means that there has been an estimated net oil drainage toward the property from the balance of the pool of 1.3 million barrels.

References

1. Watts, E. V., "Some Aspects of High Prssures in the D-7 Zone, Ventura Avenue Field," A.I.M.E. T.P. 2204, May 1947 (Pool S-29-C).

2. Littlefield, Gray and Godbold, "A Reservoir Study of the West Edmond Hunton Pool, Oklahoma," A.I.M.E. T.P. 2203, Nov. 1947.



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BYPRODUCT POWER via Topping Turbines

by J. B. Glasby*

DUE to the age and condition of a number of the boilers in the various boiler houses in the Philadelphia refinery of The Atlantic Refining Co. and the need for additional steam and electrical power, a survey of the entire problem was made in 1940. In order to understand all the factors involved, the following equipment is described. While the Philadelphia refinery consists of two separate units, known as the Atlantic and Philadelphia yards, we will only consider the Philadelphia Yard.

Description of Boiler Units

No. 9 boiler house, built in 1929-1930.—Four 350-hp. Heine boilers, rated at 200 psi. and operating at 180 psi. with an average hourly output of 66,900 lb. of steam. Maximum hourly output is 95,000 lb. of steam.

This boiler house utilizes a sludge-disposal fuel system, burning sludge from acid-treated sludge oil, tank bottoms, sewer cleaning, etc., with enough fuel oil to insure proper combustion.

No. 18 boiler house, built in 1918.—Eight 1,000-hp., B. & W., Stirling boilers rated at 180 psi. and operated at 175 psi., with an average hourly output of 288,000 lb. of steam. Maximum hourly output is 415,000 lb. of steam.

This boiler house burns fuel oil and 25 to 30 per cent of refinery gas.

No. 21 boiler house, built in 1931.—Three 329-hp., Walsh-Widener boilers, rated at 425 psi. and operating at 405 psi., with an average hourly output of 53,700 lb. of steam at a maximum hourly output of 68,000 lb. of steam.

This boiler house burns fuel oil and refinery gas.

In addition to these boiler houses, there are several hot-oil-heated steam generators and waste-heat boilers supplying 165-psi. steam for process purposes throughout the refinery.

At the time of the survey, our own generating equipment consisted of 1,500 kw. of 480-volt, 25-cycle and 2,200 kw. of 2,300-volt, 25-cycle service with a frequency changer whereby we purchased 60-cycle power from the local power company, changing to 25-cycle to meet the 25-cycle demand. This unit has a capacity of 3,000 kw., 90 per cent power factor, 2,300 volt, 25 cycle.

The average amount of purchased 60-cycle power was 8,884 kw. and the average steam demand, 408,000 lb. per hour for the Philadelphia Yard. At this time, the estimated increase in steam demand was 140,000 lb. per hour and, in 60-cycle power requirements, approximately 4,500 kw. All the boilers in No. 18 boiler house required reconditioning, which involved replacing all the tubes and drums in each boiler.

Study of Various Arrangements

In an effort to consider all possible methods of satisfying the above requirements, various arrangements were studied. These included the following:

1. Continuation of present plant operation with cost revised for a fuel-oil price of $1.00 per 42-gal. barrel. (It is interesting to note that, while this price of fuel oil was used throughout the survey, the present-day price of fuel oil is approximately $2.50 per barrel.)

2. Reconditioning all the boilers in No. 18 boiler house, with a continuation of present plant operation, purchasing 60-cycle electrical power as needed from the power company.

3. Replace three of the boilers in No. 18 boiler house with others of modern design (125,000 lb. per hour, 200-psi. pressure), reconditioning of five others, and continuation as at present, purchasing 60-cycle power as needed.

4. Installing a new high-pressure, high-temperature boiler plant with two 125,000-lb.-per-hour boilers adjacent to No. 21 boiler house with attendant back-pressure turbogenerators exhausting into 165-psi. yard steam system and generating a part of our 60-cycle power requirements, reconditioning five of the eight boilers at No. 18 boiler house and continued operation of all present equipment.

5. Same as No. 4, except larger boilers would be used and some of the present equipment could be taken out of service.

6. Installing a new high-pressure boiler plant adjacent to No. 21 boiler house to supply steam to unit mechanical drives that would be installed to replace existing motor drives on process unit pumps, etc., with these turbines exhausting into the 165-psi. yard steam system. The boilers in No. 18 boiler house would be reconditioned and present plant operation would be continued, with a greatly reduced amount of purchased 60-cycle power.

7. Install new high-pressure, high-temperature boiler house and combination of back-pressure and condensing turbogenerators, for total 60-cycle generation. The exhaust of the back-pressure turbogenerators would supply the needed process needs throughout the refinery. Standby equipment would consist of one extra boiler and one extra of each type turbogenerator. The operation of No. 18 boiler house would be discontinued, the remaining equipment operated as at present, with the severance of service from the local power company.

8. Installing a new boiler house, but operating at extremely high pressures and temperatures, the other changes the same as Nos. 4, 6, and 7.

Various modifications of the above plans were also considered with different size boilers and turbogenerators being used.

Final Plan Selected

The plan finally selected was No. 4, which consisted of installing two new 125,000 - lb. - per - hour high-pressure boilers (650 psi., 750° F.) adjacent to No. 21 boiler house with attendant byproduct power - generating equipment (two 3,500-kw. back-pressure turbogenerators, exhausting into the 165-psi. yard steam system, with a 400-psi. bleed extraction of 15,000 lb. of steam per hour) and continuing the operation of all the existing boiler houses. In addition, all eight boilers in No. 18 boiler house would be reconditioned to carry the remainder of the 165-psi. steam load.

The reasons for selecting this plan were as follows:

1. The returns on investment (23.1 per cent) were better than the other plans.

2. The partial power generation would give increased protection against complete loss of power should there be a failure of local power company.

3. The distribution of generated power would reduce the demand on the main substation, making the equipment available for future increased loads and would also permit work to be done at this substation with a complete shutdown of the section of the refinery in that area. (New refinery units have already utilized the increased load, thus made available at this substation.)

4. By generating over half of our power requirements and planning shutdowns of the new boiler house and power house with refinery unit shutdowns, the purchased power load fluctuations would be at a minimum.

5. The effect on purchased power of an emergency shutdown of a turbine or boiler would not be as great as in those cases where the average purchased power loads are extremely low.

6. This case is a step towards further power generation should this be considered advisable at a later date. Actually, after the initial boiler house was construct-

*Power and test engineer, The Atlantic Refining Co., Philadelphia. Paper presented at the American Institute of Electrical Engineers' winter general meeting, February 2, 1949, New York.

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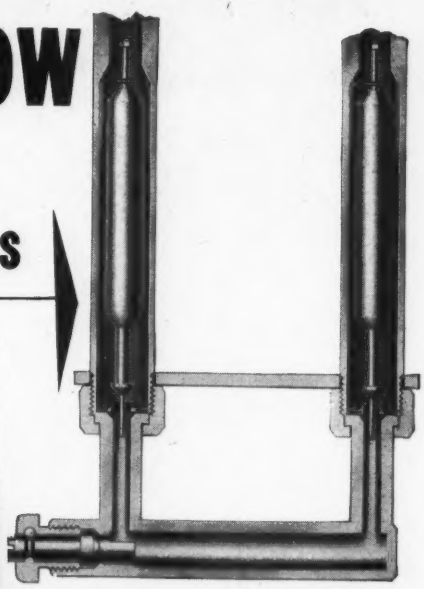

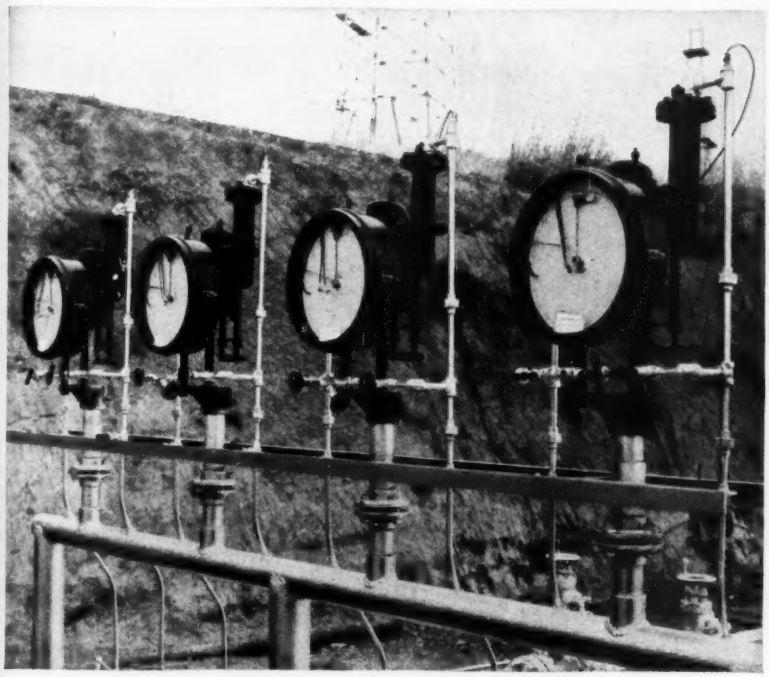

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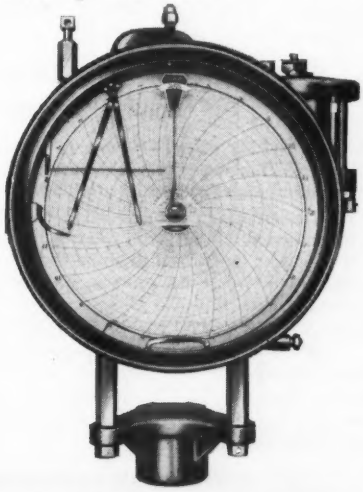

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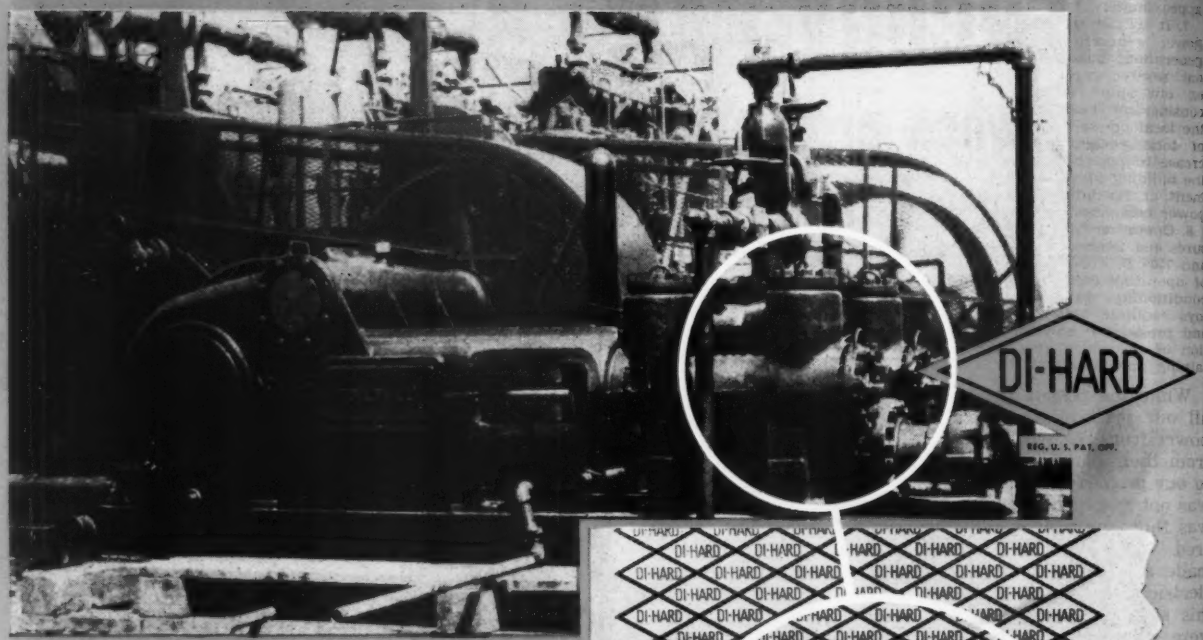

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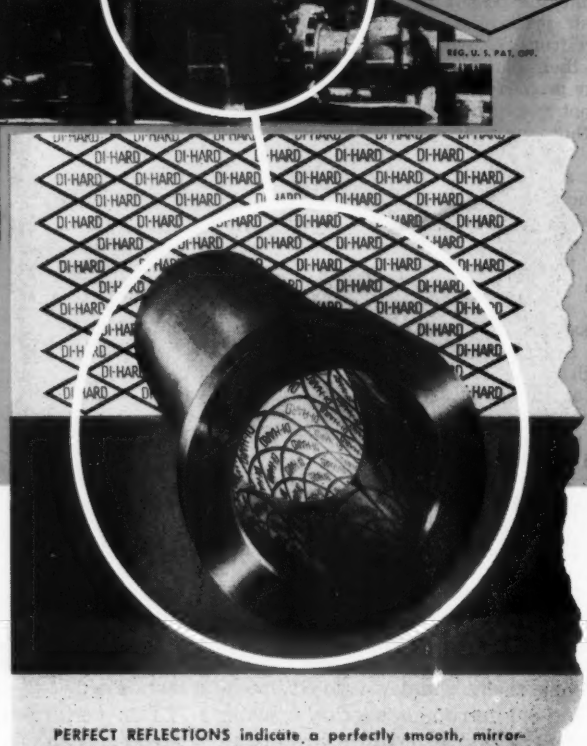

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ed with two 125,000-lb. per hour boilers, a third boiler was installed and the two 3,500-kw. generators are now being operated at approximately 4,000 kw. each continuously.

7. It is advantageous to adopt partial power generation in preference to total generation, because with total generation our reserve capacity would be dependent on our spare equipment and, therefore, considerably less than that available from the local power company. Also, in the case of total generation, any appreciable increase in power demand would necessitate the building of additional generating equipment or resuming services with the local power company.

8. Operation of the new boilers at pressures and temperatures in excess of 650 psi. and 750° F. introduces a greater possibility of operating difficulties due to feed-water conditioning. In addition, the special alloys required for the higher temperature and pressure conditions would delay erection of the plant due to difficulty in obtaining materials.

While the possibility of purchasing all our process steam and electrical power from the local power company from their plant to be built adjacent to our property and burning our fuel was not mentioned above, this project was thoroughly analyzed and considered. A consulting engineering firm made a detailed study of this steam electric project in 1938. The results of this study clearly indicated that we were in a favorable competitive position to duplicate the type of installation the power company could make. In fact, it would have been necessary for the power company to have built a plant not just large enough to meet our needs, but one with approximately three times the capacity in order to obtain a reasonable return on the investment. It would also be necessary for us to install a considerable amount of piping for steam, water, fuel oil, and gas from widely separated areas throughout our refinery to the site of the plant. Inasmuch as the local power company did not pursue this plan any further with us and, since we could effectively compete with any plan they could offer, we gave it no further consideration.

Under the plan selected, our No. 22 boiler house was built in 1943 with two 125,000-lb.-per-hour boilers operating at 650 psi. and 750° F. These are Babcock & Wilcox integral furnace type, three-pass boilers with water-cooled walls and floor, a hair-pin-loop-type superheater and a two-pass air heater. Each boiler has four circular register-type burners with steam mechanical atomizers for Bunker C oil and alloy rings for refinery gas. Each boiler has one combination forced and induced-draft fan unit with dual drive. The boilers are completely automatic in operation, having Bailey Meter Co. control, metering and recording equipment for steam flow, feed water flow, forced draft flow, fuel oil and combustion control. This includes hand automatic control selector valves for manual control, if desired.

The efficiency of these boilers is 86 per cent and the total solids in the steam leaving the boilers averages 0.5 p.p.m. In 1948, a third boiler was installed similar to the above two except that it has a capacity of 150,000 lb. per hour. This was necessary to meet increased process steam demand throughout the refinery and also to enable us to operate our topping turbines, to be described later, at maximum output.

Feed-Water Treaters

The feed water for these three boilers and the boilers at No. 21 boiler house is treated in two Cochrane hot process water softeners and deaerators. The present total steam output of these two boiler houses is 460,000 lb. per hour and, since we have 10 per cent blowdown, the total amount of feed water required is 506,000 lb. per hour. There is a total of but 35,000 lb. per hour of returned condensate from the various refinery units and 40,000 lb. per hour of 15-psi. steam used for feed-water heating which ultimately becomes feed water, requiring a makeup of 431,000 lb. per hour of raw water, or 85 per cent. This raw water is Schuylkill River water, some of which has been partially treated and filtered but all of which passes through this Cochrane equipment.

This process provides for two stages of water softening, deaerating, storage of boiler feed water, and hot deaerated water storage for backwashing purposes and for condensate oil removal.

The first-stage treatment employs lime and soda ash and the second stage, phosphate or phosphoric acid. The raw water first passes through a vent condenser to two downspray heaters, wherein the water is heated to within 2° to 3° of the 15 psi. steam temperature. Directly after heating, the lime and soda ash are added from individual chemical feeds automatically controlled and measured, and precipitation of the hardness results. In this sedimentation tank, the water is stirred in corkscrew fashion, bringing about intimate mixture of the chemicals with the water and facilitating flock formation, so that the decanted water through the uptake funnel will have a turbidity of the order of 5 to 10 p.p.m.

The clarified water is decanted from this sedimentation tank, passes upward to an atomizer where incoming steam brings about complete deaeration and increases the temperature to that of the saturated steam. This deaerated water is then received by an annular storage compartment with a retention time of 45 minutes. Phosphoric acid is introduced at the atomizer for bringing about intimate mixture of the chemicals with the water. The phosphoric acid reacts with this highly alkaline water and reduces the hardness to zero. A portion of the phosphate sludge is precipitated and can be withdrawn by the sludge lines provided. This water, which now has zero hardness and zero oxygen, is filtered through filters charged with anthracite and is then delivered to the suction of the boiler feed pump at a temperature of 240° F. There are no feedwater heaters used in this installation.

Power House Is Modern Design

Although No. 22 boiler house was built in 1943, the power house to go with it was not built until 1946 due to war conditions. This power house, designated as No. 4, is of extremely modern design with a red quarry tile brick floor, the walls glass tile up to a point 9 ft. high, the remaining walls and ceiling being acoustic tile. There is no piping or conduit inside the power house. All such lines connect to the turbines and generators from the bottom and are brought to the unit in a 7-ft. basement room. All auxiliary pumps and equipment are installed in this basement.

The lighting in this building consists of eight combination incandescent and mercury vapor fixtures which are proportioned to give shadowless illumination of a light quality similar to daylight. These indirect fixtures are mounted in torchiers in the pilasters reflecting from the acoustic tile ceiling.

The building is completely sealed off from the outside and all air coming in, except for the opening of doors, which are usually kept closed, passes through air filters installed in the north, east, and west walls. Three ventilating fans mounted in the ceiling provide sufficient pressure differential for an ample flow of air. This air is heated in winter by means of steam coils placed inside each filter box and a comfortable temperature can be maintained at all times.

Electrical Equipment

The only other equipment besides the two turbogenerators is the electrical control panel and switchboard and an instrument panel for pressure gages and flow meters for each turbine. All other electrical equipment, such as switchgear and circuit breakers, is installed in other rooms in the power house.

The turbines are General Electric, 11-stage pressure compounded and rated at 3,500 kw. with a throttle steam pressure of 600 psi. and 725° F. total temperature. Provision is made for 400-psi. extraction bleed of 15,000 lb. per hour from the first stage of each turbine when operating at 3,500 kw. The turbines exhaust at 165 psi. into the yard steam lines for process purposes throughout the refinery. This exhaust steam, as it leaves the turbine, has a superheat of approximately 125° F. and, in order to blend it in with the other yard steam lines, it is passed through a desuperheater and reduced to saturated conditions. Twenty thousand pounds per hour of return condensate are used in the desuperheater to reduce the superheat-

XUM

ed steam to saturated steam and, in this way, an additional 20,000 lb. per hour of 165 psi. steam is actually generated.

While these machines are nominally rated at 3,500 kw., we have been operating them at 4,000 kw. without encountering overloading difficulties. Excitation of the generator is provided by direct current generators flexibly connected to the main generator shaft; cooling is effected by forced air circulation in a closed system, with a water-cooled air cooler mounted on the top of the generator but enclosed by the generator casing.

Rotors Solidly Connected

The horizontally mounted turbine and generator rotors are solidly connected and rotate on three pressure-lubricated babbitt bearings. The governor and double-deck oil pump are mounted on a common vertical shaft at the high-pressure end of the turbine. This shaft is driven by the main turbine rotor through a worm and gear. The flyweight governor effects its control through a two-relay hydraulic system. The initial turbine speed is set by a synchronizing device which is no more than a means of varying the fulcrum height of the primary relay linkage. These variations from this setting start a train of events which ultimately open or close the steam chest valves to counteract the variation. The double-deck gear oil pump provides lubricating and governor oil pressures of 40 and 55 psi. respectively through relief valves. Another relief valve drops the bearing oil pressure to 10 to 12 psi. Should the oil-pump discharge pressure drop below 35 psi. an auxiliary single-stage steam-turbine-driven centrifugal oil pump starts.

Also incorporated in the oil system is a steam oil heater for heating the oil before starting. A centrifuge and oil filter keeps the oil clean during operations and a water-cooled oil cooler prevents excessive oil temperatures. The cooler and heater each are equipped with bypasses to permit temperature control. A unique arrangement of the oil system is that all auxiliaries except heater, cooler, and centrifuge are enclosed in the main oil tank which is located beneath the main floor of the power house. Another feature is that the external oil lines consist of two concentric pipes, the inner one containing cooled oil to the bearings, the outer one containing hot drain oil. These features reduce fire hazards and clean up the unit's appearance.

The turbine steam glands consist of labyrinth seals. Between the outermost and the next seal is a chamber which is exhausted to prevent steam leakage into the building. Exhaust is provided by condensing the leaking steam and pumping it away with a motor-driven vacuum pump which can handle either water, vapor, or air.

System Completely Enclosed

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During the past year, we have generated approximately 40 per cent of our 60-cycle power requirements in this power house. We are generating at a cost of approximately 4 mills per kw.-hr. The cost of generating power consists of operating labor, maintenance expenses, overhead, depreciation, and steam costs. This steam cost is the ratio of the B.t.u. required to generate power with these generators to total B.t.u. input to No. 22 boiler house times the total operating cost of No. 22 boiler house.

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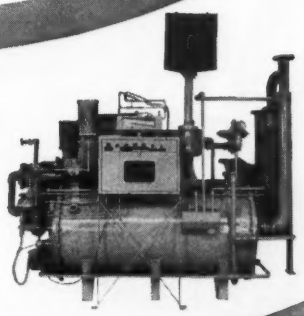

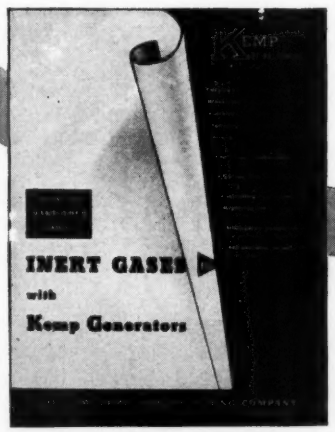

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4—*Summarization Statement on:*

INJECTION-WELL HISTORIES IN WATER FLOODING

by Dr. Morris Muskat*

IN many respects the theoretical understanding of secondary-recovery operations is in a less satisfactory state than the primary phase of reservoir performance. As compared to the latter, in which production rates are generally limited by voluntary or state imposed regulations, the transients in secondary-recovery operations are usually more rapid and comprise a more important part of the operational history. The dynamics of the physical processes are more intimately related to the reactions of individual wells and to their geometrical distribution. This is especially true in the case of water flooding.

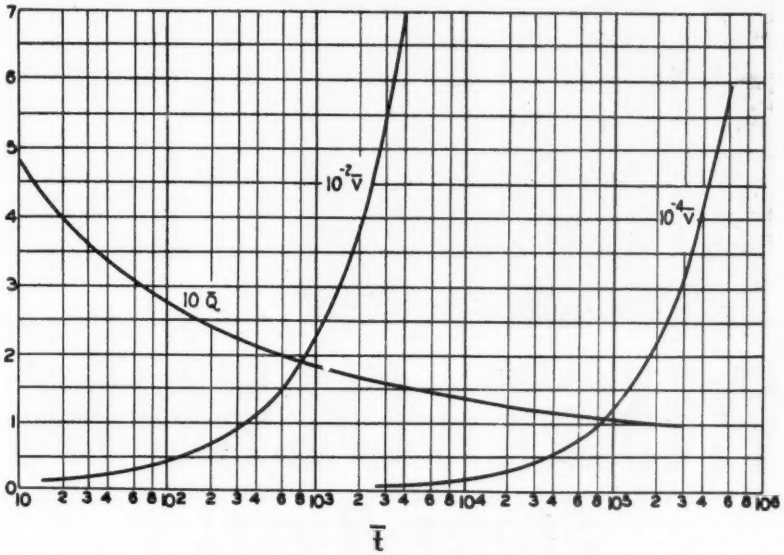
It has been customary to assume that water-flooding systems can be approximated by steady-state analogs. But theoretical analyses and electrolytic models based on the steady-state approximation have been used to evaluate various types of flooding well patterns. Yet, except for effects of nonuniformity of the producing section, the steady-state phase of water-flooding operations will not develop until the last stages of the producing history. It seems more appropriate to base the dynamics of water flooding on the associated transient phenomena, as has been indicated in recent investigations.

While the treatment of the transient history of water-flooding systems requires a number of simplifying assumptions, it is possible to make a reasonably approximate analysis of the situation, at least with respect to the behavior of the water-injection wells. If the reservoir is assumed to be depleted, at the time water injection is begun, to a uniform low pressure, the individual injection wells can be treated separately during the initial injection period as isolated systems. The injected water can be considered as expanding radially, while continually driving forward a growing annular oil bank. The bounding radii of the latter will have a constant ratio. The increasing radius of the liquid-saturated area will result in an increasing resistance to continued injection, so that the rate of intake for a fixed pressure differential will decrease as the reciprocal of the logarithm of the cumulative injection volume. Dimensionless universal relationships—analytical or graphical—can be developed for the time variation of the injection rate or cumulative injection volume.

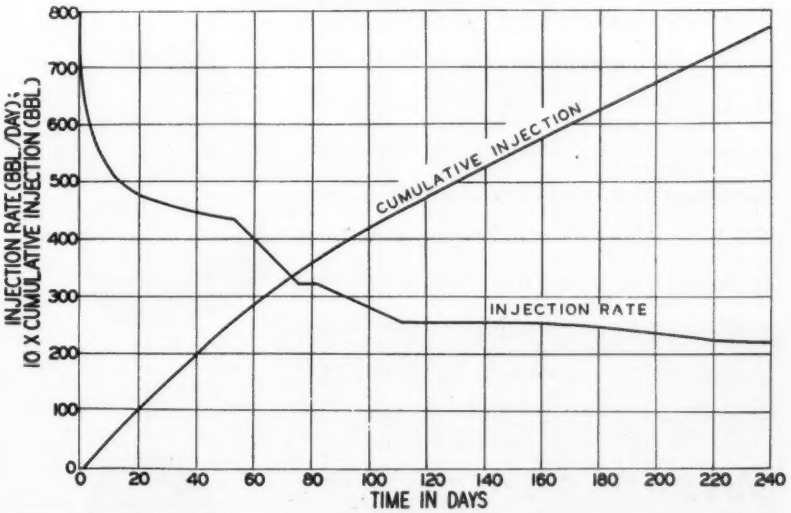
*Gulf Research & Development Co., Pittsburgh.

The radial spread of the oil bank and water-flooded area will continue until the affected areas of neighboring wells come in contact. The volumetric coverage during this period will be 39.3 per cent for the line-drive square network, 78.5 per cent for the five-spot, 90.7 per cent for the four-

THE THEORETICAL VARIATION OF THE DIMENSIONLESS INJECTION RATES $\bar{Q}$, AND CUMULATIVE INJECTION VOLUMES $\bar{V}$, WITH THE DIMENSIONLESS TIME $\bar{t}$, DURING THE RADIAL EXPANSION PHASE



THE CALCULATED WATER-INJECTION HISTORIES OF A COMPOSITE THREE-LAYER FORMATION



(With this series of articles on reservoir engineering, Dr. Muskat presents a number of important relationships in graphic form. These specific diagrams have not previously appeared in print.)

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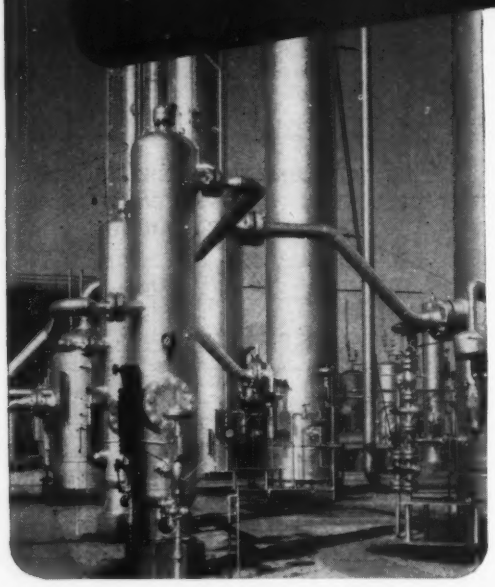

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spot, and 60.5 per cent for the seven-spot network. When interference between the injection wells develops the radial expansion of the flooded area and oil banks about the individual wells will become distorted and the flow will begin to change in accordance with the producing well distribution. The detailed history during this period cannot be described analytically. However, it is reasonable to assume that it will merge into steady-state conditions after a complete fill-up of the flooded section, and that the approach to the latter takes place linearly. The steady-state flow behavior thus represents the virtual endpoint of the over-all flooding history.

While it is not feasible to compute acutal sweep efficiencies corresponding to those given by the steady-state analysis, the flooded coverage during the radial expansion phase should give minimal values, in uniform formations. The fluid motion will be controlled more by the injection than by the producing wells. The latter will play a lesser role than implied by the steady-state analysis. A comparative evaluation of different well patterns indicates that for the same total well densities the seven-spot network will have the lowest fill-up time and the lowest steady-state through-flow capacity after fill-up has taken place. At the time injection-well interference develops the injection rate per injection well will be greatest for the square-line drive and lowest for the four-spot. In all patterns the transient injection rates will exceed the steady-state values unless the oil mobility should be especially low.

Under the assumption of idealized stratification the transient flooding history of nonuniform reservoirs can be derived by a superposition process. The resultant performance will be a composite of an overlapping sequence of developments of interference and fill-up in the individual strata in accordance with their permeabilities.

The study of the observed performance of water-flooding operations in several instances tends to support the transient theory analysis.

Several Pertinent References

1. S. T. Yuster and J. C. Calhoun, Jr., Prod. Monthly, 9, 40, Nov. 1944.
2. P. A. Dickey and K. H. Andresen, A.P.I. Drill. and Prod. Practice, 34, (1945).
3. S. T. Yuster, Prod. Monthly, 10, 38, Nov. 1945.
4. S. T. Yuster, Penn State College Bull 40, No. 3, 43, Jan. 18, 1946.

West Tepetate Louisiana

(Continued from page 84)

curred or not, the fraction of oil recoverable for the Miller No. 3 zone is lower than for the Miller No. 1 zone.

Dollar values and equity percentages.—After the acre-feet of productive sand for each tract in the Miller No. 1 and Miller No. 3 zones were

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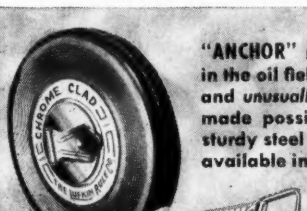

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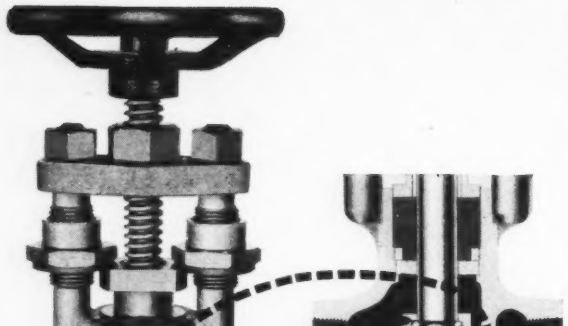

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determined, the various factors for porosity, connate water, reservoir hydrocarbon volume factors, and predicted efficiency of production were used to calculate the production and dollar value of hydrocarbons initially recoverable. The amounts of production of gas and oil from each zone to January 1, 1948, were subtracted from the initially recoverable gas and oil. The calculation of acre-foot dollar value and fraction remaining recoverable for Miller No. 1 oil column is shown in Table 2.

The fraction-remaining-recoverable factors were multiplied by the dollar values of the corresponding sands in each tract. The total dollar value of remaining recoverable oil and gas in the Miller No. 1 and Miller No. 3 zones was then determined for each tract and for the unit area. The respective percentages of the total dollar value of remaining recoverable hydrocarbons thus became the equity percentages for each leased tract. Typical calculations for a single tract are presented in Table 3.

Acknowledgment

All of the factual data in this paper are of record with the Louisiana Conservation Department, Hon. S. L. Digby, Commissioner. The paper is published by permission of Harold W. Manley, vice president, Barnsdall Oil Co. The unitization agreements were prepared by M. Darwin Kirk, head of legal department and a vice president of Barnsdall Oil Co., Tulsa. Credit is given to Jay B. Wharton of the firm of Bates & Cornell, and to Harold L. Geis of Barnsdall Oil Co. for their valuable geological work on this project. Assistance, gratefully acknowledged by the authors, was also received from Don L. Moore, Johnny R. Morris, Keith Lindley, Marion D. Olive, A. E. Hoffman, F. W. Boethin, W. D. Mason, Jr., and a number of other engineers and operating men.

BOOKS

TENTATIVE STANDARDS OF HYDRAULIC INSTITUTE—PIPE FRICTION. Published by the institute, 90 West Street, New York. 82 pp.

This volume presents the results of an investigation undertaken during 1946-47, to revise the pipe-friction data formerly contained in its Data Section Standards. The new data are based on Paper No. 44-SA-4 entitled "Friction Factors for Pipe Flow" by Lewis F. Moody, profesor of hydraulic engineering at Princeton University, and published in the 1944 A.S.M.E. Transactions. The data presented have been issued as a tentative standard to provide a suitable experience period.

OIL AND GAS FEDERAL INCOME TAXATION. By Kenneth G. Miller. Published by Commerce Clearing House, Inc., 214 N. Michigan Avenue, Chicago. 251 pp. $6.50.

The author's avowed purpose in writing this work is to correlate the law, regulations, rulings, and decisions applicable to this specialized tax field. A feature of the book is appropriate quotations from the leading cases and rulings. It is a book of the law as it is now. What the law should be and what it will be are not included within its scope. The 25 chapters in the book pretty well cover the entire complex structure of the difficult technical tax problems of the oil and gas industry.

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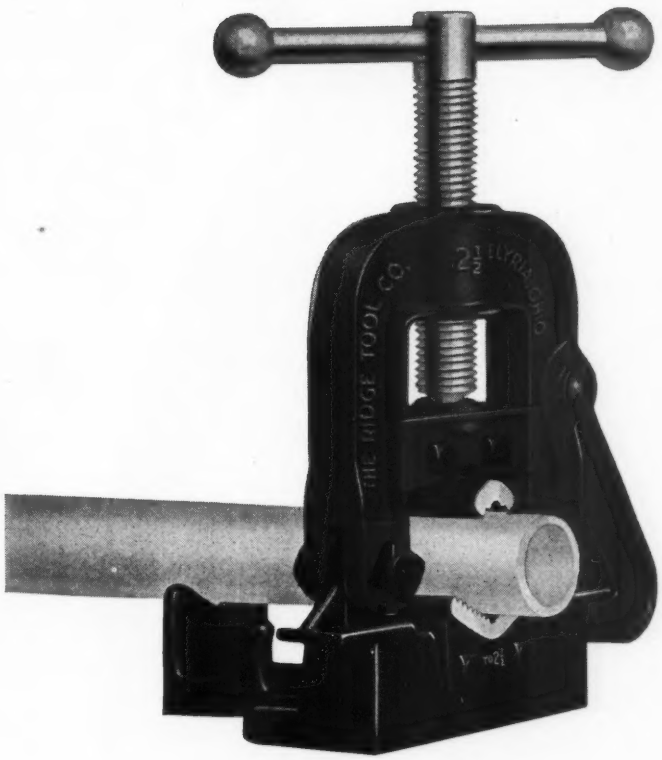

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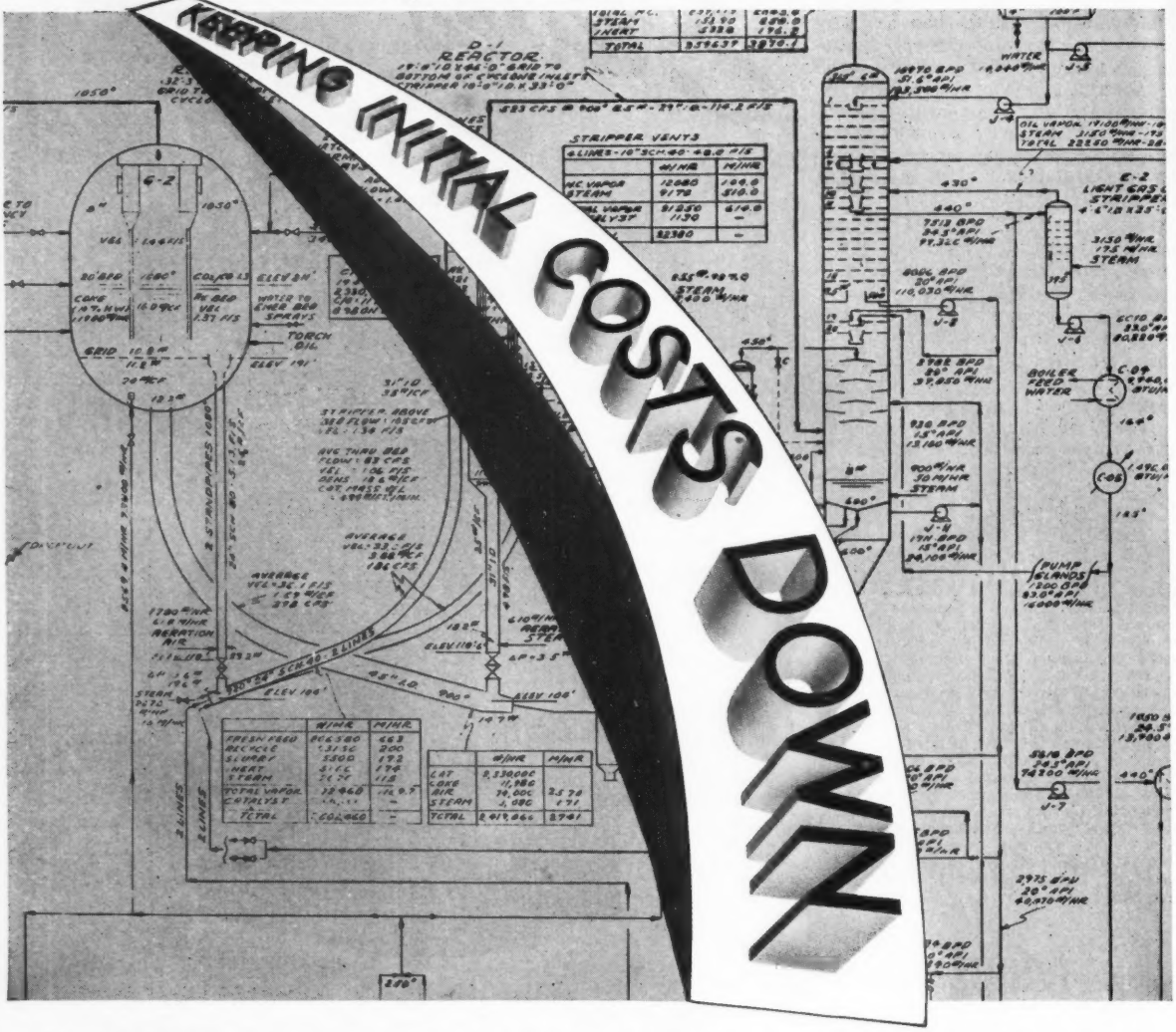

KELLOGG starts to keep costs down at the precise point where a refinery project starts . . . in process design. For it is the quality of work in the design phase that establishes not only the ultimate earning potential of the unit but also the framework on which initial costs are predicated.

Quality of process engineering is, of course, dependent on the relative ability of individual engineers, their resources in data and experience, the emphasis put on process design by management . . . and, in the final analysis, on the organizational set-up within which the engineers work. Beyond the marked advantages Kellogg can show on the first three factors, its organizational set-up definitely assures *superior quality* in process engineering.

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Cost-imating

A WEEKLY FEATURE OF THE OIL ANG GAS JOURNAL

Depreciation Rates—Petroleum

(See Cost-imating No. 19, February 24, 1949, for Refinery Equipment)

DEVELOPMENT EQUIPMENT, USEFUL LIVES, YEARS*

Boilers:	
Bad water	2
Good water	5
Oil field	8
Derricks:	
Steel	10
Wooden:	
Bolted	6
Spiked	5
Drilling equipment, well, cable tool	6
Drilling machines, well:	
Core	10
Portable	10
Rotary	8
Engines:	
Gas or gasoline	10
Oil	10
Steam	15
Generators and lighting equipment, electric	10
Motors	10
Pipe lines, fuel, and water	5
Pumps, boiler feed or slush	8
Rig irons	10
Tanks, fuel and water, portable	8
Tools:	
Clean-out, cable	8
Drilling, cable	6
Fishing, cable	6

MARKETING EQUIPMENT, USEFUL LIVES, YEARS*

Compressors, air, small	10
Marketing equipment, oil	20
Meters, gas	33
Pipe, gas-distribution lines	50
Pumps, filling station	10
Racks, loading	20
Regulators, gas distribution	33
Tanks, storage:	
Horizontal, cylindrical	30
Underground	20
Service stations complete	25

PRODUCTION EQUIPMENT, USEFUL LIVES, YEARS*

Casing	20
Control heads	15
Derricks, pumping:	
Steel	20
Wood	10
Dewatering apparatus, gas	15
Engines:	
Gas or gasoline	15
Steam	20
Jacks, pumping	20
Lift equipment, gas and air	10
Meters, field	25
Motors, electric	15
Pipes, flow lines	15
Power plants, well pumping	20
Pulling machines	10
Pumping units, electrical	20
Regulators, gas, field	25
Rods:	
Shackle	10
Sucker	3
Separators, oil or gas	15
Tanks	20
Transformers and lines, electric	15
Treating plants	15
Tubing and packers	10
Vacuum plants, composite rate	15
Well and lease equipment as a whole	20

TRANSPORTATION EQUIPMENT, USEFUL LIVES, YEARS*

Oil Pipe Lines

	Gathering lines	Trunk lines
Rights-of-way	Indefinite	
Line pipe	25	40
Line-pipe fittings	25	40
Pipe-line construction	25	40
Buildings	25	50
Boilers	30	30
Pumping equipment	33	33
Machine tools and machinery	30	30
Other station equipment	30	30
Oil tanks	30	40
Delivery facilities	25	25
Communications system	25	25
Office furniture and equipment	20	20
Vehicles, etc.	7	7
Other property	20	20
Cars, railroad tank	28	28

Gas Pipe Lines

Meters and regulators	33	33
Pipe lines	25	40
Pump stations	25	40

*Bulletin F. of Bureau of Internal Revenue, U. S. Treasury Department, January 1942.

No. 21 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

Estimating Vapor Pressure

What is the relationship between Reid vapor pressure and gasoline distillation range? Such a relationship would be useful to us in plant control.—F. R. P.

About the only relationship that comes to mind is that of Trimble and Richardson (Ref. Nat. Gaso. Mfr., December 1935, page 562) entitled, "Estimating Reid Vapor Pressure from A.S.T.M. Distillation Data." These conclusions are shown in Fig. 1 on this page. The 5 per cent and 20 per cent A.S.T.M. evaporation temperatures are required. About 2,500 samples of motor gasoline were examined and only 17 of them showed deviations from Fig. 1 greater than 1 lb. R.v.p.

Other earlier attempts to obtain such a relationship are those of Bridgeman, Aldrich and White (Journ. S.A.E., May 1929), and of Oberfell, Alden and Fitch (*The Oil and Gas Journal, May 31, 1928*).

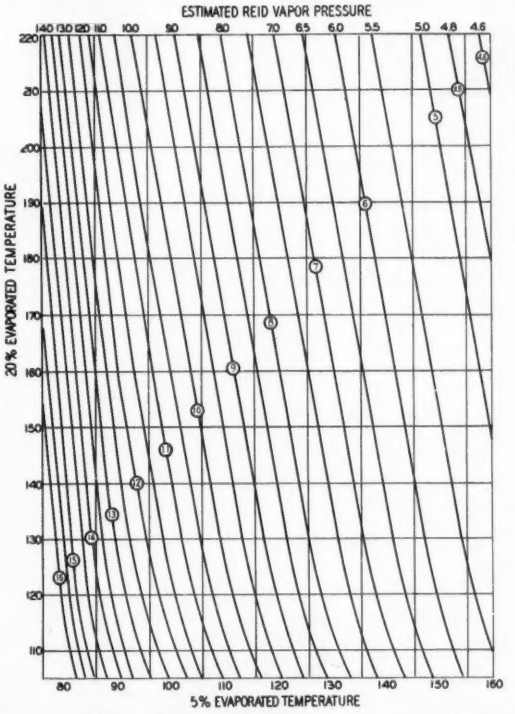

Fig. 1—Relation of 5 and 20 per cent evaporation temperatures to the vapor pressure of gasolines

Inflammability Limits And Combustion

We noted your articles of January 13 on Inflammability Limits of Mixtures, and would like to make inquiry as to whether the information given is applicable to furnace combustion as well as to actually explosive mixtures.—H. E. A.

Fundamentally, the information on the limiting compositions of explosive mixtures give in the January 13 Questions on Technology is applicable to furnace flames or gas clouds. However, the usefulness of the information is limited with regard to furnace combustion because the composition of the burning flame is not uniform throughout. In general, the main center or core of the flame will be too rich in combustibles to burn, and we believe that decomposition of the combustible takes place in the central core of many flames. If the core receives enough primary air to form an explosive mixture it too may burn, or a minor explosion occurs which may extinguish the flame.

Normally, the core is surrounded by a sheath of mixture that contains enough air for combustion and this sheath burns. The oxygen for combustion come from both the primary and the secondary air, but active burning can proceed only because secondary air feeds into the mixture from the furnace.

Thus in a properly functioning burner or flame, explosion occurs at no point in the flame, and in certain regions of the gas cloud the amount of oxygen or the amount of dilution gases is not right for complete combustion. The equilibrium between the several components of fuel gases, combustion products, and dilution gases is different at all points, and the computation of such equilibrium relations is extremely complicated.

Some general information can, however, be obtained from the figure of the question of January 13. For mixtures of one combustible gas and one inert gas, the limits of inflammability of the mixture and of the oxygen content of the mixture with air, can be read directly. Also, the smallest amount of combustible gas that can be present if diluted with the noncombustible gas, and still have a mixture that will explode or burn upon mixing with air, can be read directly from the figure for each pair of common gases.

Mercaptan Distribution In Gasolines

What is a typical distribution of methyl, ethyl, etc., mercaptans in straightrun and in cracked gasolines?—R. P. C.

The distribution of mercaptans in gasolines is not consistent for any type of gasoline. However, the compositions of thermally cracked gasolines are apparently more consistent than other types of gasoline. Table 1 from Happel, Cauley, and Kelley (Critical Analysis of Sweetening and Mercaptan Removal, *The Oil and Gas Journal, November 12, 1942, page 136*) indicates the mercaptan contents of some gasolines.

TABLE 1—MERCEPTAN DISTRIBUTION IN SOME 100°-400° F. GASOLINES

	Straightrun				Thermal cracked						Houdry catalytic		
Gasoline—	M.-C.	M.-C.*	M.-C.	Kans.†	M.-C.	E. Tex.	E. Tex. vapor phase	M.-C. vapor phase	M.-C. coking	Polyform M.-C.	M.-C.	M.-C.	Kans.
Mercaptan, per cent of total content:													
Methyl	3.1	3.9	21.3	8.5	18.6	15.1	13.4	35.6	12.4	16.5	16.0	58.1	3.4
Ethyl	5.3	15.7	7.1	6.7	33.7	15.8	23.4	29.1	21.9	30.8	17.0		6.5
Propyl	10.0	30.6	11.0	11.5	10.9	19.7	19.8	9.3	24.9	29.0	8.0	11.3	5.3
Butyl	16.0	45.2	11.3	17.7	14.8	14.9	10.4	7.0	23.6	9.6	8.0	7.4	3.5
Amyl	12.2	4.6	10.5	55.6	9.5	6.9	6.8	4.6	15.6	9.4	8.0	3.1	5.8
Thiophenols, hexyl and heavier	8.2-45.2	...	38.7	...	12.5	27.5	26.2	14.4	1.6	4.7	43.0	21.0	61.7-13.8
Mercaptan sulfur in sample % by wt.	0.0078	0.009	0.0093	0.0099	0.020	0.035	0.020	0.0314	0.090	0.080	0.0090	0.0089	0.0117

*Only 100°-275° F. boiling range. †Only 100°-300° F. boiling range.

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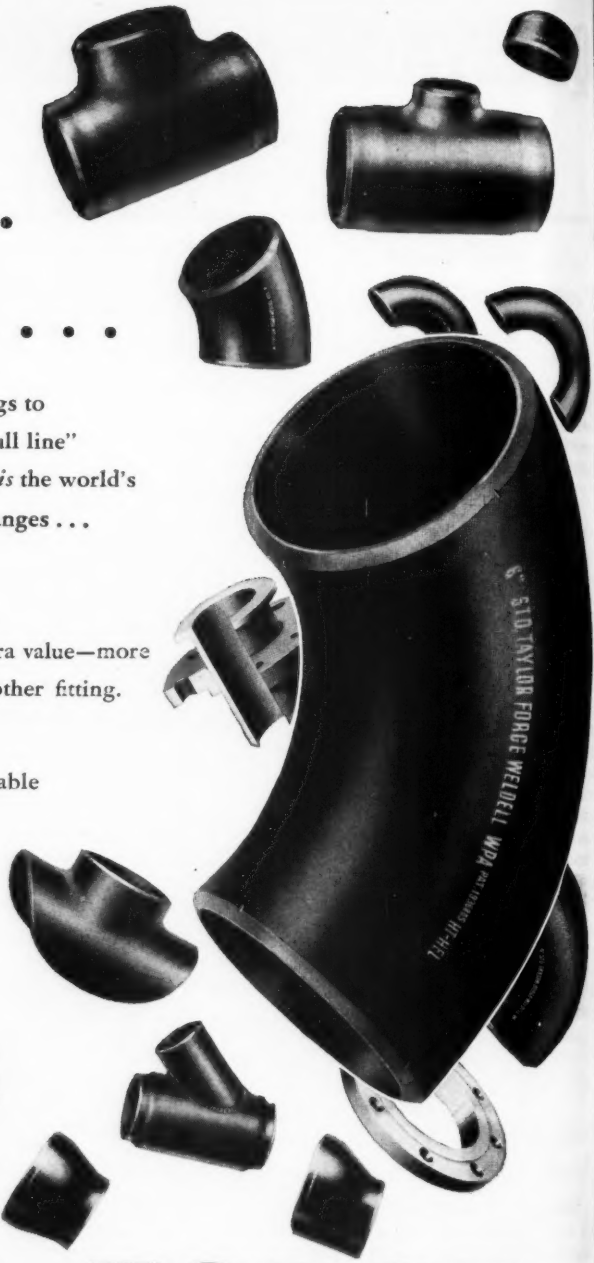

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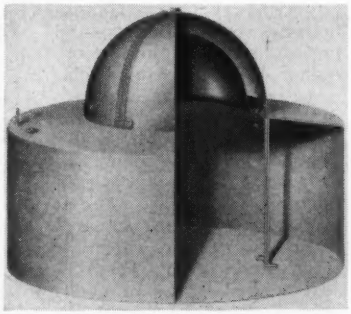
OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

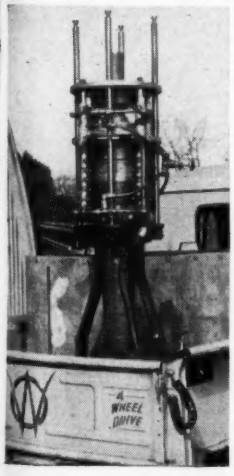
by Dan B. Miller

(1) VAPORDOME ROOF is a special type of roof for flat-bottom oil-storage tanks. It provides a variable volume vapor space which allows the air-vapor mixture above the liquid in the tank to expand and contract without venting vapor to the atmosphere. It is used primarily to reduce standing storage evaporation losses. When rising temperature causes the air-vapor mixture in the tank to expand, or when filling occurs, the flexible membrane in the dome at the center of the roof rises to make room for the increased vapor volume or the vapor that is displaced by liquid. A tank with a Vapordome roof may be operated as an individual unit or it may be connected by vapor lines to the vapor spaces of one or more adjacent tanks. *Chicago Bridge & Iron Co.*



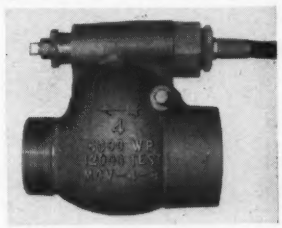
IT'S NEW ✓ CHECK IT

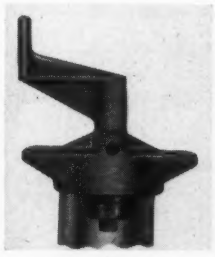
(2) APPLICATOR FOR DRILL-PIPE PROTECTOR applies protector in 1 minute. It can be mounted on a truck for accessibility, and can be lowered to horizontal working position by one man. Tapered spline mandrels assure even expansion of rubber from both ends, preventing tearing or distortion of protector. Mandrels are activated by hydraulic pressure. Protector rubber is forced from spline mandrels, up onto the sleeve mandrels which are then locked together with hydraulic cylinders by valve. Backing plate is removed from tool before transferring rubber to pipe. Transfer cage with rubber stretched, is removed from hydraulic jack and placed over drill pipe at desired position. Rubber is discharged from sleeve mandrels onto pipe with aid of hydraulic stabilizers. *Weatherford Oil Tool Co., Inc.*



IT'S NEW ✓ CHECK IT

(3) DRILL-PIPE MUD-CONTROL UNIT offers a quick and positive means of chasing drilling fluid from kelly and drill pipe. Through the use of compressed air and/or steam, the permanently installed equipment overcomes the nuisance of wet connections or wet trips. The control valve gives an added safety control by preventing back flow in the drill pipe of the drilling mud under blowout conditions. After the well has been shut in by blowout preventers and the check valve provided, it is still possible to pump through the unit provided the pressures are not greater than the pump pressures available, so that the hole can be circulated by bleeding off at the blowout preventer, thus controlling the well under shut-in conditions. Should weighted fluid be required, the weighting material can be added and introduced through the drill-pipe mud-control valve and the hole bled off until sufficient weight has been built up in the drilling mud to overcome formation pressures. *Mud Products, Inc.*

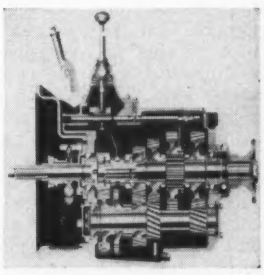




Cap

IT'S NEW ✓ CHECK IT

(4) MODEL 4-A-112 TRANSMISSION. This transmission is designed for both on and off-highway applications where a high percentage of operation through gears in conjunction with auxiliaries is required. High capacity in this transmission is insured by the use of helical gearing in all four forward speeds.



The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

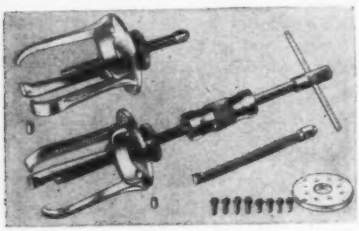
Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

OIL AND GAS EQUIPMENT Digest — IT'S NEW CHECK IT

The helical gears, easily engaged by sliding jaw clutches, permit easy shifting. Extra-heavy bearings are used throughout the model. In combination with a three-speed auxiliary transmission, Model 4-A-112 provides 12 forward and 3 reverse speeds. When used with a two-speed auxiliary, eight forward and two reverse speeds are obtainable. Model 4-A-112 also offers a wide range of ratios, with optional second and reverse speeds. *Fuller Manufacturing Co.*

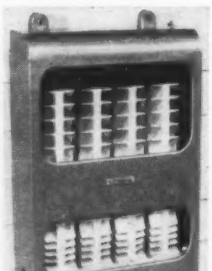
IT'S NEW CHECK IT

(5) NEW PULLER. This is a three-jaw puller that produces safe, uniform power and can easily be used by any mechanic. Spring tension holds the jaws on the work, and a locking nut makes it possible actually to lock the puller on the job so it will not come off until released, allowing the operator to use both hands for the actual pulling operation. Jaws are forged and specially heat treated to provide all the toughness needed for any job within the size range of the tool. Maximum jaw capacity on outside holds is 8½ in. and the jaws are reversible to operate through a 2½-in. opening for inside pulls on bearings and sleeves. The yoke is forged with two sets of jaw slots allowing the jaws to be moved closer to the center for better gripping power on small jobs. It is available as either a screw type or combination of screw and booster hammer type. *Snap-On Tools Corp.*



IT'S NEW CHECK IT

(6) EXPLOSIONPROOF ELECTRIC HEATER. This heater is made to comply with Underwriters' Laboratories class 1, Group D, hazardous locations and was recently approved by that group. It is specially designed for use in atmospheres containing gasoline, petroleum, naphtha, acetone, benzol, solvent vapors, and natural gas. Heater incorporates a patented cast aluminum, natural convection, safety grid. The heating element consists of a nickel chromium resistor wire, insulated and sheathed in a seamless metal tubing, which is embedded in a one-piece finned aluminum casting completely sealing the element, eliminating fire, shock, and burn hazards. *Electromode Corp.*

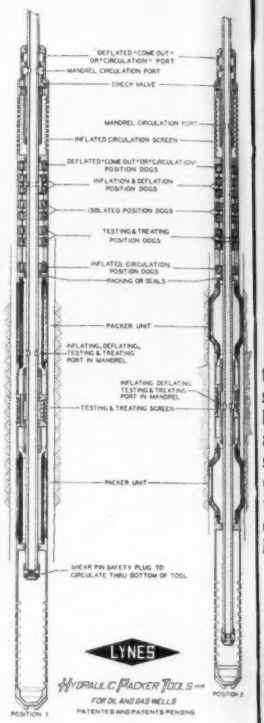


IT'S NEW CHECK IT

(7) WIRE-BRAID STEAM HOSE. Heart is strong rubber tube, incased in braids of high-tensile steel wire, resistant to heat and high pressure. An open braid of asbestos next to outer wire braid assures perfect cover adhesion. A new method of static control is the crossed wire braiding in the asbestos section. The cover is extra tough to resist abrasion, specially designed to resist high temperatures. Extra flexible, this hose is recommended to refineries, core drilling, and other high-pressure jobs. *Boston Woven Hose & Rubber Co.*

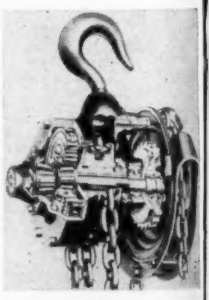
IT'S NEW CHECK IT

(8) LYNES HYDRAULIC PACKER. This new equipment provides a positive seal or shutoff by "inflating" hydraulically; no slips are used. To pull or change packer position, the seals are easily "deflated." There are two major parts: outer housing, which contains two packing elements; and inner mandrel which connects directly to tubing or drill pipe. Packer is run with lower mandrel port opposite upper packing element. When packer is at desired position, applying fluid pressure from surface causes both elements to enlarge and effect positive seal against casing or open hole. Packer is deflated by reversing procedure. Tool can be reset as many times as desired — on one well packer was set 11 times without removal to surface. *Lynes, Inc.*


DEFLATED "COME OUT" OR "CIRCULATION" PORT
MANDREL CIRCULATION PORT
CHECK VALVE
MANDREL CIRCULATION PORT
INFLATED CIRCULATION SCREEN
DEFLATED "COME OUT" OR "CIRCULATION" POSITION DOGS
INFLATION & DEFLATION POSITION DOGS
ISOLATED POSITION DOGS
TESTING & TREATING POSITION DOGS
INFLATED CIRCULATION POSITION DOGS
PACKING OR SEALS
PACKER UNIT
INFLATING, DEFLATING, TESTING & TREATING PORT IN MANDREL
INFLATING, DEFLATING, TESTING & TREATING PORT IN MANDREL
TESTING & TREATING SCREEN
PACKER UNIT
SHEAR PIN SAFETY PLUG TO CIRCULATE THRU BOTTOM OF TOOL
LYNES
HYDRAULIC PACKER TOOLS
FOR OIL AND GAS WELLS
PATENTED AND PATENTS PENDING
POSITION 1
POSITION 2

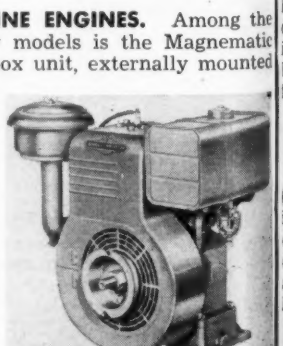
IT'S NEW CHECK IT

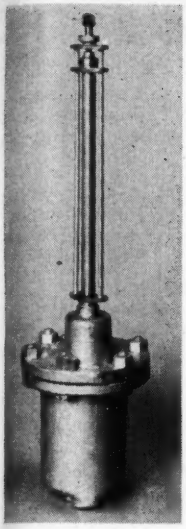
(9) AUTO-BLOC HEAVY-DUTY HOISTS. These hoists match light-duty units in portability, and incorporate the strong construction features for heavy-duty work. Outstanding feature of it is its simplified hoisting mechanism. It employs two gears, a cam-actuated floating inner gear and an outer gear to which the load sheave is rigidly connected. Auto-Blocs are available in 16 standard models of ½ to 40-ton capacity. Every hoist is factory tested for 50 per cent overload. *David Round & Son.*



IT'S NEW CHECK IT

(10) AIR-COOLED GASOLINE ENGINES. Among the features of these three new models is the Magnematic ignition system. A breaker-box unit, externally mounted on the crankcase, incloses easily adjustable breaker points, condenser, manual stop switch, and remote stop switch terminal. This system produces a high voltage at very low speeds and incorporates an automatic spark retard and advance, assuring quick, easy starting. *Briggs & Stratton Corp.*





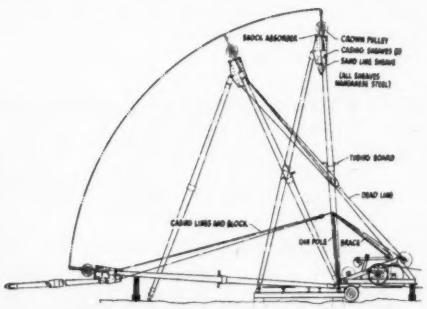
(11) SPEEDYVENT, a high-pressure air vent for steam-using equipment, provides rapid and continuous escape of air from equipment and piping while closing tight against both steam and hot or cold condensate. Properly installed on the condensate return line, it is the key to fast heating and effective gravity return in closed systems eliminating the need for traps, condensate receivers, pumps, motors, relays, floats, and controls. *Livingstone Engineering Co.*

IT'S NEW CHECK IT

(12) CYCLON CORROSION-RESISTANT PLASTIC COATINGS. This line of corrosion-resistant plastic coatings has been developed especially for the petroleum industry for the protection and maintenance of processing equipment including pipe and storage tanks. CycLon, series "NPC" is an easily applied, high solids synthetic paint that protects metals, wood, and ceramic surfaces against chemical attack by corrosive fumes, condensates, and spillage. CycLon air dries quickly by solvent evaporation to an adhesive, hard-wearing, flexible glossy coating without the necessity of priming the surface being coated. *Munray Products, Inc.*

IT'S NEW CHECK IT

(13) IMPROVED YOUNG SPUDDER in skid-type frame, is mounted on a 5-in. tubular rear axle equipped with four pneumatic tires on an 82-in. track. Air brakes are



METHOD OF ERECTING SELF-SUSTAINING TRIPOD MAST

provided. If desired, wheels can be removed for transporting spudder on a carryall, and when necessary, axle may also be removed for skidding spudder into place with a tractor. Weight is 36,000 lb. Reduction in weight has been accomplished without loss of ruggedness or durability. Increased drilling depth (3,000 to 7,000 ft.) is claimed for the improved spudder. It can be driven by any gas diesel-drilling engine of sufficient power for the desired well depth. *Young Engine Corp.*

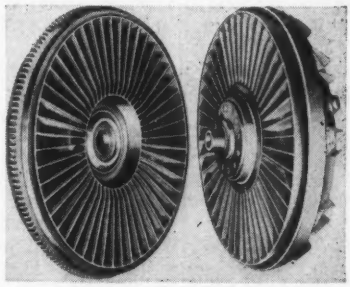
IT'S NEW CHECK IT

(14) NEW PRESOAK FOR HEAVY-DUTY EQUIPMENT is an especially effective presoak for cleaning oil-well equipment and extra-heavy-duty equipment covered with crude oil, heavy greases, etc. It is free-rinsing, and has a high flash point above 150° F. and a long effective life. *Kelite Products, Inc.*

IT'S NEW CHECK IT

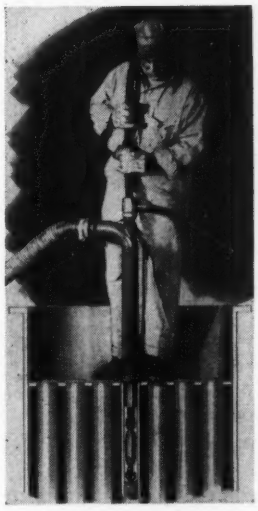
OIL AND GAS EQUIPMENT Digest — IT'S NEW CHECK IT

(15) GYROL-FLUID COUPLING, one of the outstanding developments of recent years in Chrysler automobiles, is now available on certain Chrysler industrial engines. The coupling, complete with clutch, clutch housing, and either a three or four-speed transmission is offered on models 5, 6, 7, 8, and 12 of the industrial-engine line. The gyrol-fluid coupling which provides a safety cushion between the source of power and the load, fills a need for power-transmission improvement in certain types of industrial installations. The coupling permits the engine to be accelerated close to the torque peak with the output shaft turning at a lower speed. The necessity for declutching for brief periods when operating the engine without load is eliminated. In these cases, the brake is applied and the engine allowed to idle, the coupling, meanwhile, slipping to permit free turning of the engine. *Industrial Engine Division of Chrysler Corp.*



IT'S NEW CHECK IT

(16) CLEANER FOR TUBULAR-TYPE CATALYST REACTORS OR CONVERTORS, makes catalyst cleaning a simple, one-man job, accomplished conveniently from top of reactor. Equipment weighs only 30 lb., can easily be shifted from tube to tube. Utilizes a standard air-driven tube-cleaner motor, which has enough clearance in tube to permit loosened catalyst to be blown by exhaust air from motor to top of tube where it is discharged through an elbow. A pneumatic dust seal at top prevents dust leakage. The Flexotube is neoprene lined and covered, and is thus immune to the chemical action of the catalyst. The deflector elbow is fitted with an adapter which fits end of tubes. A sponge-rubber gasket seals the tube end. Tube-cleaner motor is equipped with a fishtail bit. In most cases, tubes become metal bright by sand-blasting effect of broken-up catalyst. *Elliott Co.*



IT'S NEW CHECK IT.

(17) IMPACT SUPERSOCKETS are adaptable to all socket locking methods used on the various types and makes of power and impact wrenches. They are made of extra-tough alloy steel, specially heat-treated, to withstand the constant shock and pounding involved in electric and pneumatic impact-nut setting or power-nut running. Supersockets are available in seven

square drive sizes with hex openings from 3/16 to 3½ in. and eight-point openings from 5/16 to 1¼ in. in regular and bolt clearance lengths. *J. H. Williams & Co.*

IT'S NEW ✓ CHECK IT

TRADE LITERATURE

(18) CURRENT DATA ON HIGH-VACUUM APPARATUS. This eight-page booklet makes available the most recent information on developments in the field of high vacuum. It is well illustrated both pictorially and diagrammatically. *Distillation Products, Inc.*

(19) AUTOMATIC CONTROLS. A general catalog, No. C-4, gives complete technical data on all items manufactured by the company along with diagrams for installation. *Automatic Control Co.*

(20) BUILD WITH STEEL. Complete descriptive literature, perforated for binding in loose-leaf folder, gives details of all construction features of the prefabricated steel buildings, racks, clamps, hangers, and other attachments offered. *Unistrut Products Co.*

(21) CONTROLLED FLOW AUTOMATIC PEN, a folder describing the pen made for all recording instruments using circular charts, including orifice meters, proportioning meters, rate of flow controllers, temperature recorders and pressure recorders. *Chartomatic Co.*

(22) NULLMATIC DIFFERENTIAL PRESSURE TRANSMITTERS is an eight-page brochure describing the principle of operation of this pressure transmitter with schematic diagrams and charts. *Moore Products Co.*

(23) OVERSHOTS. A revised and improved operation and maintenance manual contains complete specification sheets on tools and accessories. *S. R. Bowen Co.*

(24) TUBULAR HEATERS, an exceptionally well prepared book, presents details of construction, applications, maximum working pressures and temperatures for each unit. *Black, Sivalls & Bryson, Inc.*

(25) KLINGERIT. This departmentalized catalog gives the features, dimensions, and capacities of the valves, level indicators, cocks, and packing manufactured by the company. *Richard Klinger, Ltd.*

(26) FLOATS, a 20-page brochure, illustrates each item made and includes information on construction, application, and the best material for each job. *Chicago Float Works, Inc.*

(27) COMMERCIAL CHEMICAL DEVELOPMENT, a leaflet, discusses a good many of the economic questions faced by chemical engineers and executives as to the market for chemical products. *R. S. Aries & Associates.*

(28) VOSPER is a folder describing the power pipe and bolt threading machine that cuts, threads, or reams pipe up to 2-in. diameter. *V-Mac Industries, Inc.*

IT'S NEW ✓ CHECK IT

(29) ELECTRIC TIMERS. The leaflet illustrates and describes the various types of timing devices made, along with the function and uses of each. *R. W. Cramer Co., Inc.*

(30) ENNISCOPE describes an oil-water-ratio computer and recorder, and gives complete installation details, illustrated with diagrams. *Oil Well Water Locating Co.*

(31) PACKINGS. Three folders setting out the advantages of the company's liner packings, steam packings, and fluid rod packings. *Universal Packing & Gasket Co.*

(32) RAMBLER RIG AND HYDRAIR HOIST. The 34-page bulletin covering Hydrair hoists, truck and trailer models of Rambler drilling and servicing rigs, Kwik-Lift masts, Hy-Lift rams, and mud pumps is liberally illustrated with drawings and photographs accompanied by performance data and specifications. *International Derrick & Equipment Co.*

(33) NEW LATHE-ATTACHMENT CATALOG. More than 130 different attachments and accessories are illustrated and priced in this new 28-page catalog, including some recently developed attachments not previously announced. *South Bend Lathe Works.*

(34) STORY OF MARSH STEEL is a well-illustrated history and presentation of the present facilities of the company's plant in Kansas City, Mo., including a section on the various processes carried on in the plant. *Marsh Steel Corp.*

(35) SELF-PRIMING CENTRIFUGAL PUMPS is a catalog describing the line of electric pumps and their adaptability to refineries, natural-gasoline plants, derrick barges, and as cargo pumps. *Construction Machinery Cos.*

(36) DRIVE CHAINS. This 60-page book illustrates photographically each item the company offers, diagrammatic sketches of chain links and tables to help figure the length of chain required. *Jeffrey Manufacturing Co.*

(37) M.S.A. COMBINATION SKULLGARD-WELDING HELMET, an illustrated bulletin describes a new headgear for welders. Also included in the bulletin are views of various styles of welding helmets along with complete descriptive data. *Mine Safety Appliance Co.*

(38) CONDITIONING AQUEOUS SYSTEMS, an eight-page booklet, goes into detail on water conditioning, scale control, and corrosion inhibition, and recommends chemicals for particular application. *Wright Chemical Corp.*

(39) Z-CRETE DESIGN FOLDER. A file of design data sheets and other information relative to the installation of conduits for insulating heated piping installed underground. A practical and efficient method of construction for wet, acid soils. *Zonolite Co.*

IT'S NEW ✓ CHECK IT

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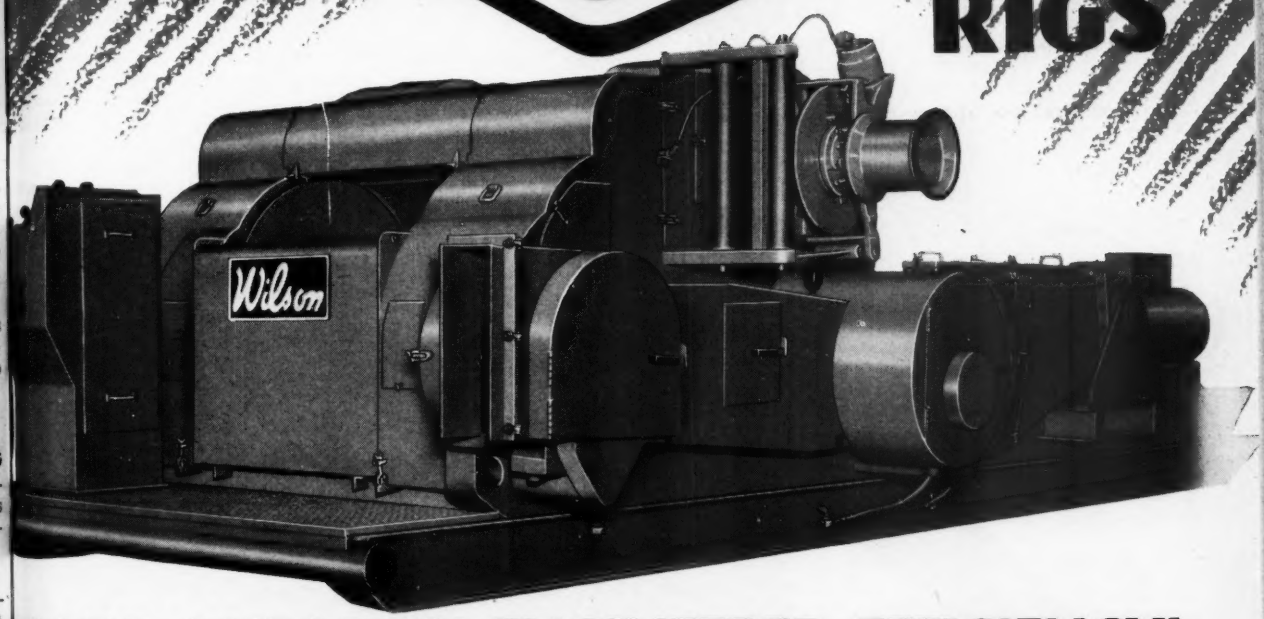
Wilson

SENSATIONAL NEW

GIANT Torcair

DRILLING RIGS



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PIPE LINES

El Paso-P. G. & E. Project Authorized

PROJECTS of El Paso Natural Gas Co. and Pacific Gas & Electric Co. for transmitting Permian basin gas from West Texas to Central California and San Francisco areas were authorized by Federal Power Commission last week.

El Paso will construct approximately 247 miles of 30 and 26-in. line looping the company's present 26-in. line from the Permian basin; about 95 miles of 24-in. line in Texas to reach gas supplies; approximately 102 miles of 26-in. and 17 miles of 30-in. line extending from El Paso's Gila compressor station in Central Arizona to the Colorado River, near Needles, Calif.; approximately 80,000 hp. in compressor capacity; and additional field lines and equipment. Estimated cost of El Paso's portion of the projects is $52,456,032.

P.G.&E. will build 506 miles of 34-in. line extending from the California boundary to its terminal near Milpitas, Calif., 16,800 hp. in compressor units, and additional lateral lines. The 34-in. line is the largest diameter ever authorized for any natural-gas pipe line. P.G.&E. estimates cost of these facilities at about $55,519,000.

El Paso proposed to finance its construction through a $34,000,000 bond issue, a $9,000,000 bank loan, and the balance from internal sources. FPC's order, however, said construction program does not necessitate El Paso's securing a bank loan at this time. P.G.&E. said its program will be financed along with other construction projects of the company from funds on hand, internal sources, proceeds from the sale of bonds and stock, and, if necessary, short-term bank loans.

The commission severed the El Paso-P.G.&E. proceeding from the one involving San Juan Pipe Line Co., and further hearing and oral arguments were held February 21 in Washington.

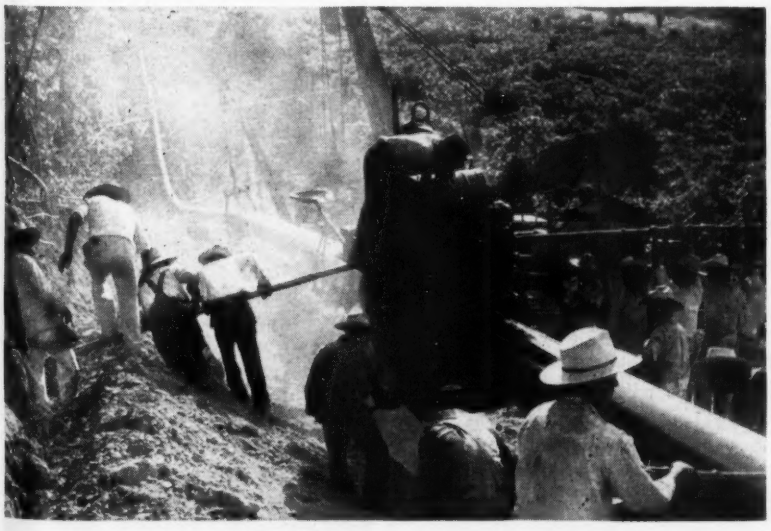
Montana Compressors to Radio Trouble Signals

Montana Power Co., a subsidiary of American Power & Light Co., has obtained the first authorization for a new type of fixed-radio system for sending warning signals when compressor stations on the company's gas line are out of order.

Montana Power operates a natural-gas pipe-line system extending south from the Sunburst area to Anaconda and Butte, Mont.

Colorado-Wyoming Gas Co. Proposal Approved by FPC

Proposal of Colorado-Wyoming Gas Co., Denver, to construct approximately 41 miles of additional natural-



Application of priming coat in construction of 150-mile 20-in. Poza Rica-Mexico City natural-gas line constructed for Petroleos Mexicanos. Operation of the line will be inaugurated at ceremonies to be held on the March 18 holiday

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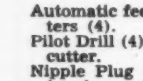
Nipple Plug (5), permits removal of tapping valve . . . an exclusive feature.

***Patent No. 2,097,398**
Other Patents Pending.



THE PIG WITH THE POKE CLEANS PIPE LINES

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TULSA 9, OKLAHOMA

gas pipe line on its system, and to install appurtenant-meter stations and compressor units, has been approved by Federal Power Commission. The company also received FPC authorization to abandon approximately 17 miles of line and two compressor stations.

Part of the pipe-line facilities are to be used to deliver gas to Greely Gas Co., for resale in LaSalle, Ault and Eaton, and to Public Service Co. of Colorado, for resale in Windsor. Estimated cost of the facilities, including those which will increase capacity of the company's system to approximately 50,000,000 cu. ft. daily, is $690,100.

Hearings Open March 14 on Michigan-Wisconsin Project

Federal Power Commission has scheduled hearings on March 14 in Washington, D. C., on joint application of Michigan-Wisconsin Pipe Line Co., and Michigan Consolidated Gas Co., for authorization to construct additional natural-gas facilities in connection with Michigan Wisconsin's Texas-to-Michigan pipe-line project, which was initially authorized by the commission in 1946.

Michigan-Wisconsin proposes increasing capacity of the 1,050-mile line by 28,000,000,000 cu. ft. of gas a year through installation of additional compressor units, which would raise compressor horsepower from 15,600 to 48,000. Line now has capacity of about 47,000,000,000 cu. ft. annually, as authorized by FPC.

In the original application for additional facilities, filed in December 1948, Austin Field Pipe Line Co. was to construct a portion of the proposed facilities. However, an amended application was filed with FPC providing that Michigan Consolidated would take over Austin Co.'s program. Other proposals by Michigan-Wisconsin include rerouting the section of main line to be built between Rulo, Neb., and the "Wisconsin Junction" near Millbrook, Ill., and substitution of 24-in. pipe for the 26-in. pipe previously authorized between Hugoton field and "Wisconsin Junction."

Consolidated Edison Files Application for Pipe Line

Consolidated Edison Co. of New York, Inc., has filed with Federal Power Commission an application proposing construction of natural-gas pipe-line facilities in the New York City metropolitan area.

The system would entail 23 miles of pipe line in New York, and would cost an estimated $8,250,000. Consolidated Edison is seeking to find if the company is subject to FPC jurisdiction, and if so, for FPC to authorize construction of the proposed facilities.

The company will receive gas from Transcontinental Gas Pipe Line Corp.,

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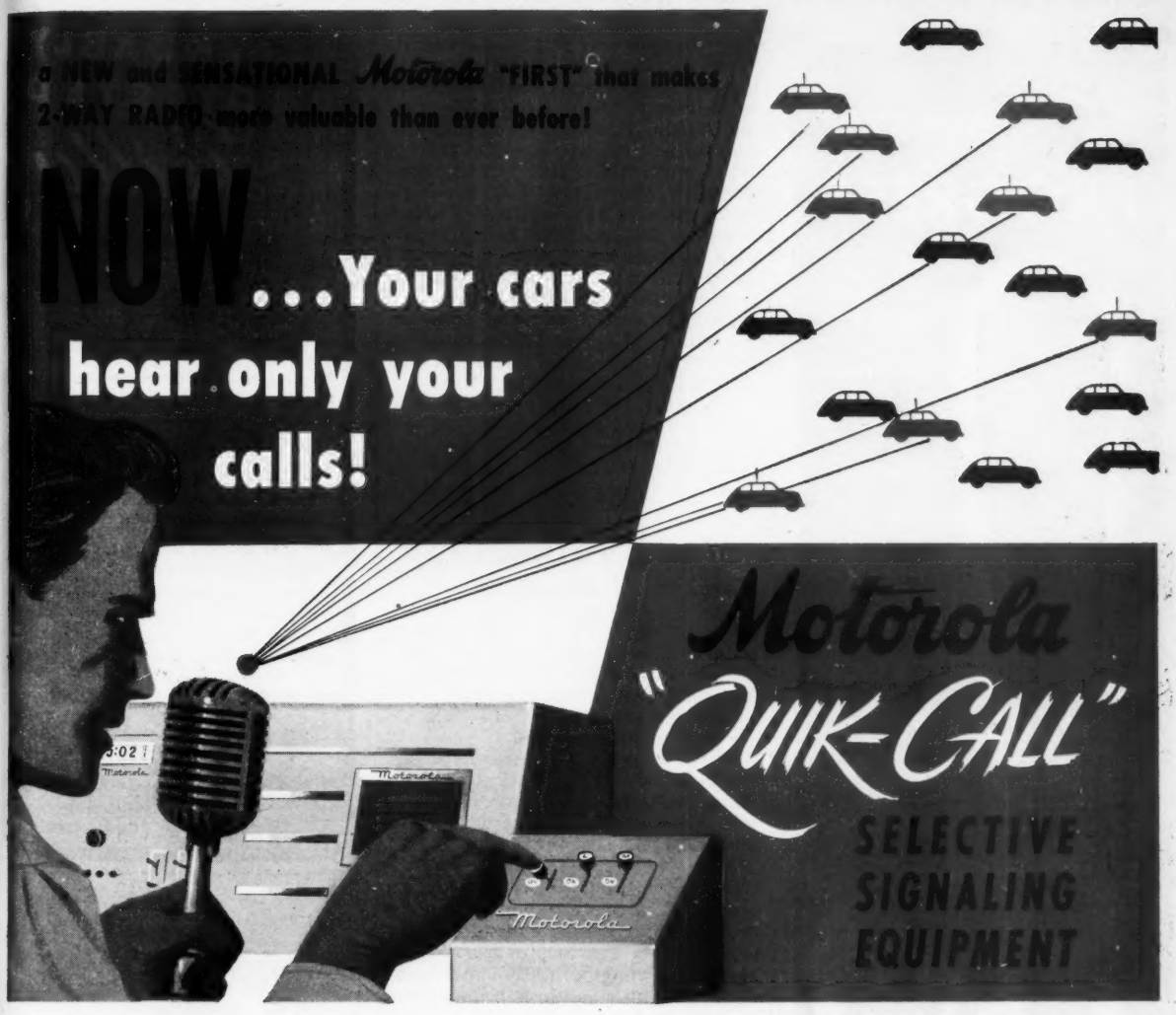

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after completion of that company's Texas to New York City pipe-line project. Consolidated Edison has entered into a construction agreement with four New York distributing companies, which are to receive Transcontinental gas. They are: Brooklyn Union Gas Co., Brooklyn Borough Gas Co., Kings County Lighting Co., and Long Island Lighting Co. Under the agreement, Consolidated will construct and operate a system of mains extending from Transcontinental's delivery point on the Hudson River at 132nd Street, to plants and individual mains of the distributing companies.

Transcontinental will deliver to the terminus 100,000,000 cu. ft. of gas daily for Consolidated Edison, and another 100,000,000 cu. ft. daily for other local distributing companies.

FPC Hearings Open on Trunkline Proposal

The Federal Power Commission opened March 8 hearings on application of Trunkline Gas Supply Co., for authorization to construct and operate a Louisiana-to-Iowa natural-gas transmission system.

The company, with offices in Washington, D. C., and Wilmington, Del., proposes to build a 26-in., 768-mile pipe line extending from Lake Charles, La., to Keokuk, Iowa.

At the request of Northern Natural Gas Co., an intervenor in the proceeding, hearings are being held at the U. S. Postoffice Building in Omaha, Neb. Previous hearings were held in Washington in September and October of 1948, and in February 1949.

Cities Service Gas Asks FPC for More Compressors

Cities Service Gas Co., Oklahoma City, has asked Federal Power Commission for authority to install additional compressor facilities on a partially completed natural-gas pipe line, from Hugoton gas field to Kansas City, Mo. The new units would add 4,790 hp. to existing facilities on the 400-mile line, which would cost $1,214,000.

Cities Service also asked FPC permission to abandon its Hutchinson, Kans., compressor station, because it is no longer needed.

Atlas to Sell Pipe Lines

Atlas Oil & Refining Corp., Shreveport, will sell its 82-mile pipe-line system, V. B. Chance, president, announced. The system includes 8 and 6-in. crude lines running from the company's refinery to Minden, La., and thence to Magnolia field in Arkansas. The firm will also sell its refining facilities, near Shreveport, Chance said. The plant utilizes about 12,000 bbl. of crude oil daily.

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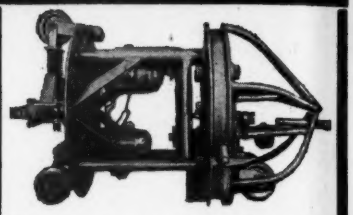

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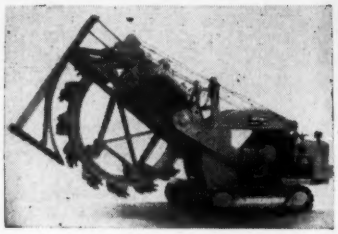

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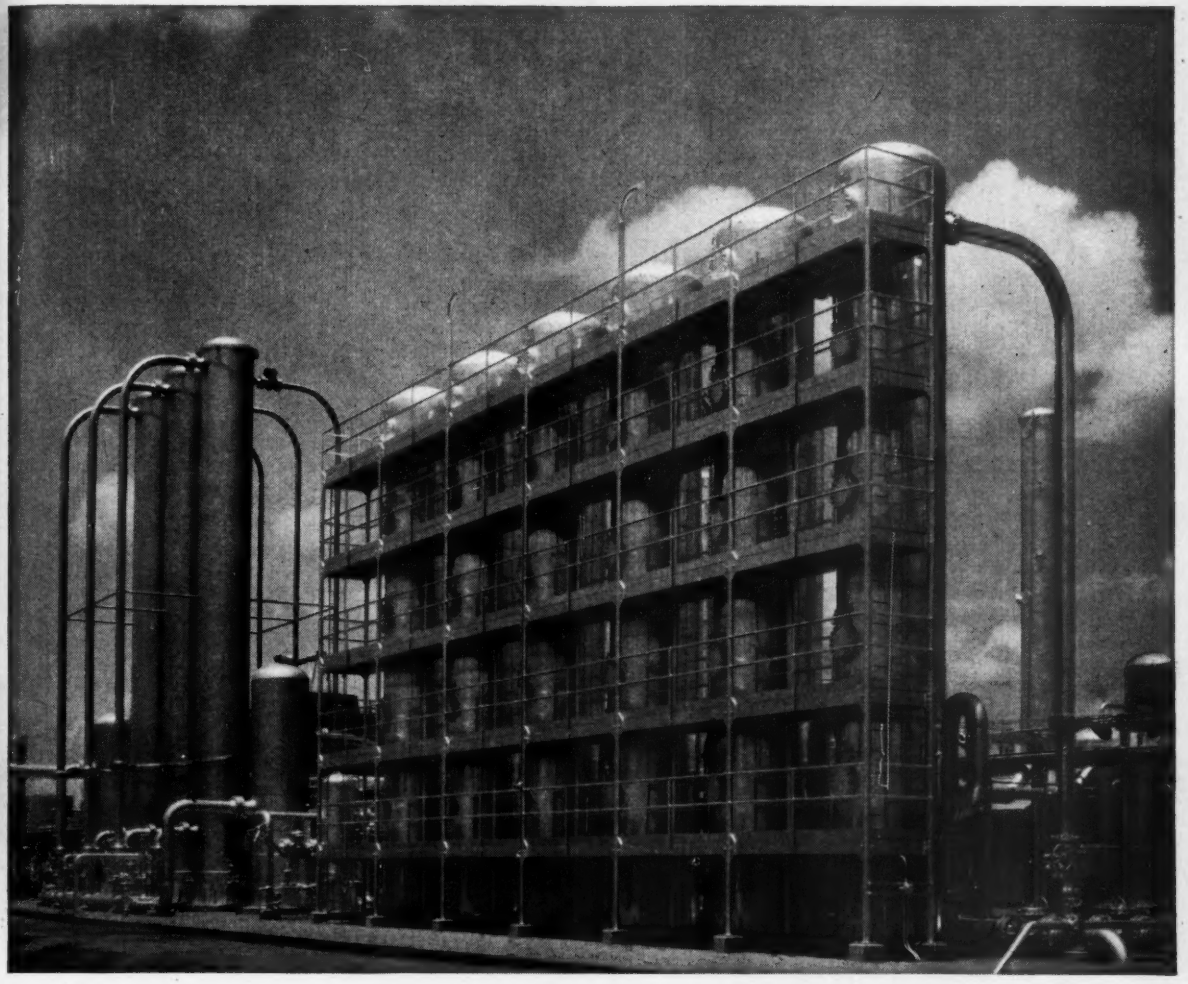

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NATURAL GAS

Gas-Conservation Job in Texas Only Half Complete

Although the state of Texas has seen the expenditure of $120,000,000 in construction of new facilities to halt flaring of casing-head gas, the job is only half complete, Ernest O. Thompson, member of Texas Railroad Commission, told the Associated General Contractors of America in New York March 2. He said that the commission had been working for years toward elimination of the waste of casing-head gas, but it was not until markets became available through pipe lines running out of the state that the gas became of such value as to pay for the cost of saving it.

Stating that the job was only 47 per cent completed, Thompson cited instances where the commission ordered fields in Texas to cease production of oil until the gas being produced could be saved.

He touched on natural-gas production in Texas, stating that of the 5,732 producing gas wells, 3,588 are shut in because "they have no present market for the gas. The law in Texas says that a gas well must be closed in within 10 days from date of completion unless there is a market for the gas."

Texas gas reserves are now 97 trillion cubic feet, Thompson said, which is approximately 60 per cent of those in the nation. During 1948 the state exported 698,000,000,000 cu. ft. of gas, or 21 per cent of that produced in the state.

FPC Hearing April 6 on Waynesboro Gas Proposal

Federal Power Commission has set hearing April 6 in Washington request of Waynesboro Gas Co., Waynesboro, Pa., to purchase gas from Manufacturers Light & Heat Co.

Waynesboro Gas originally filed application August 27, 1948, asking FPC to direct Manufacturers Light & Heat to connect its natural-gas system with the Waynesboro company's mains, and to supply gas for distribution in Waynesboro, Pa. During December 1948 hearings, counsel for Manufacturers Light & Heat made representations to the effect that before Columbia Gas System, Inc., (of which Manufacturers is a member) took on any new markets, it would file application to supply gas to Waynesboro, Pa., under terms of an existing agreement between the two companies. Waynesboro Gas then agreed to withdraw its application.

Waynesboro, however, filed a motion in February alleging that Columbia Gas System has refused to be bound by representations made by Manufacturers Light & Heat Co. counsel. Waynesboro Gas at that time requested FPC permission to withdraw from the stipulation, and asked that proceeding be reopened.

Texas Eastern Proposal Postponed Indefinitely

Federal Power Commission has postponed indefinitely hearing previously scheduled March 14 in Washington concerning supplemental suspended-rate schedules proposed by Texas Eastern Transmission Corp., to increase rates and charges on sales of natural gas by application of tax-adjustment claims reflecting a new Louisiana tax upon gas produced in that state.

This is the third postponement made by FPC on request of the company. Texas Eastern has agreed that if the new postponement was granted, it would not move to put the schedules into effect prior to final determination in the proceeding by the commission.

Gas Consumption in U. S. In 1948 Up 27.8 Per Cent

Gas consumption for 1948 by electric-utility plants showed an increase of 27.8 per cent above the previous record set in 1947, the Federal Power Commission reported recently. Total consumption for the year was 476,729,404,000 cu. ft.

Of this total, December accounted for 36,220,313,000 cu. ft., which was an increase of 21.2 per cent over December 1947, but 8.7 per cent below consumption of a month earlier, FPC reported.

Fuel oil consumed during 1948 totaled 42,699,674 bbl., a decrease of 5.8 per cent from 1947 record use.

Gas Measurement Report Ready

Revised 1948 edition of "Gas Measurement Committee Report No. 2" prepared by the gas-measurement subcommittee of the technical-research committee, American Gas Association's natural-gas department, is now available from A.G.A. headquarters, the association has announced.

Advisory Committee Named

Advisory committee for the fourth annual short course in gas technology, sponsored by Southern Gas Association, has been chosen, and will make plans for the course, to be held May 30-June 1, at Texas A. & M. College.

Natural Gasoline

Oronite Chemical Co. Is Making New L.P.G. Odorant

Oronite Chemical Co., San Francisco, has introduced a new liquefied-petroleum gas odorant to its line of odorants, which will not saturate textile material, or cause sediments to form on meters, diaphragms, and valves.

The company, together with California Research Corp., and Standard Oil Co. of California, is a pioneer in the gas-odorization field, having developed the first commercially-manufactured gas odorant for the natural-gas industry in 1930.

Although mandatory odorization of L.P.G. by manufacturers is no longer required under specifications of Natural Gasoline Association of America, many manufacturers use an odorant in the interest of safety. L.P.G., like natural gas, has no odor, and, in the case of home use, odorant is added to warn any user of possible leakage in the system.

N. G. A. A. only recently lifted mandatory odorization of L.P.G. due to the diversified use, and increased demands from industry for unstenched material. Introduction of an odorant is now optional with the manufacturer.

L.P.G. Utilities Section To Meet in Chicago May 10

Utilities section, Liquefied-Petroleum Gas Association, will hold its first meeting during the 1949 convention of the association, at the Palmer House in Chicago May 10. The association's annual convention will be held May 9-11, and the utilities section will be incorporated as a part of the regular convention program.

Among papers to be presented at the meeting will be "Problems Encountered in Interchanging Gases," by Frank Knoy, gas-research engineer, Eastern Gas & Fuel Associates, Boston, Mass.; H. Emerson Thomas, vice president, Pennsylvania & Southern Gas Co., Westfield, N. J.; and Ralph L. Sieben, who is chairman of the utilities section.

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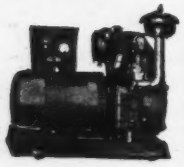

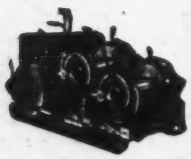

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REFINING

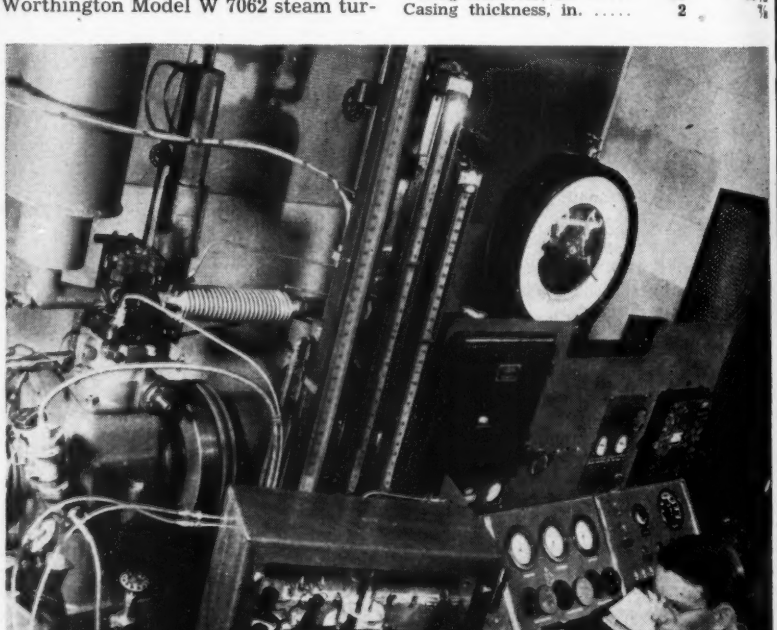
Compressor for Continental Refinery Undergoing Tests

Representatives of several oil companies, research groups, and contracting firms recently witnessed the full-load full-speed test of a new model centrifugal compressor, at the Syracuse plant of Carrier Corp. The first unit of the new Series 600 compressor is the largest ever built by that company, and will be installed to provide regeneration air for the new fluid catalytic cracking plant under construction at Continental Oil Co.'s new Billings, Mont., refinery.

Termed Model 18-T-600, the new compressor is designed for a capacity of 25 M.c.f. per minute of air at inlet conditions of 17.0 psia., 100° F., and 80 per cent relative humidity, discharging at 39.0 psia., and 275° F. The five-stage unit will operate at 4,520 r.p.m., driven by a 2,600-hp. Worthington Model W 7062 steam turbine. Designed for an adiabetic efficiency of 71.6 per cent, it showed actual efficiency of 73-75 per cent on certain shop tests.

The new model will be available in a variety of types for compressing air and other gases. Units with from three to seven corrosion-resistant impellers or wheels, will range in capacity from 15 to 32 M.c.f. per minute. Inlet pressure conditions may range to 29-in. vacuum and top discharge pressure is 150 psig. The following shows comparative data on the new unit and the Carrier 18-P-64 centrifugal compressor, now in use in a number of refinery installations:

	Model No.	
	18-P-600	18-P-64
Impeller diameter, in.	36	31¾
Max. oper. speed, r.p.m.	4,950	5,350
Critical speed, r.p.m.	8,300	6,600
Gross bearing load, psi.	60.2	49.4
Rotor weight, lb.	2,860	1,135
Weight of compressor assembled, lb.	35,000	18,000
Casing diameter, in.	66	58½
Casing thickness, in.	2	1⅛



To establish antiknocking qualities of aircraft-engine fuels, The Texas Co. has rigged up in its Beacon, N. Y., laboratories, a single-cylinder aircraft-test engine with an unusual set of control instruments. A device called the "automatic-octane blender" has been devised to check new fuels, and a new kind of intake air-temperature control enables the engineer to determine fuel performance rapidly under varying temperatures. Automatic-octane blender makes possible for the engineer to establish performance characteristics of a fuel by matching that fuel with one whose performance is known. While test is in operation, blender varies automatically the octane number of reference fuel, until it is identical with octane number of the test fuel. This eliminates manual mixing of a number of blends and checking of each against the test fuel. Only two fuels are employed in use of the apparatus: isooctane, and isooctane plus 6 cc. of lead

CAA Asks for Opinions On Sales of Avgas

In an effort to solidify the many different and conflicting points of view which have been presented to the Civil Aeronautics Administration as to how sale of gasoline and oil at airports participating under the Federal Airport Act should be handled, CAA Administrator D. W. Rentzel recently asked for comments from the aviation industry and interested parties concerning a proposed revision in the act.

The survey is being made to obtain the views of airport operators, fixed base operators, airlines, state, county, and municipal associations, and oil companies.

New Tool Developed in Production of Lube Oil

A valuable tool for use in study of lubricating greases is reported by the National Bureau of Standards. The tool has been developed for working grease and measuring its flow characteristics in the same series of operations. Principal advantages of the tool, according to the bureau, are its flexibility, wide range of shear and consistency measurements, short test cycle, simplicity of design and its provision for characteristic flow data, while working under controlled conditions.

The bureau reported that in addition to the tool's application on greases, it has been used by bureau engineers to determine the different rates of shear and temperature.

Esso Refinery Completes 2,000,000 Safe Man Hours

Esso Standard Oil Co.'s Baltimore, Md., refinery has completed 2,000,000 man hours without a lost-time accident since May 1948, the company reported. Equivalent production of 1,000 men working 8-hour shifts for 250 days set the record.

The refinery is also the leading contestant in the 8-month-old accident reduction program sponsored by the Baltimore Safety Council, with 1,685,827 man hours without lost-time injury.

Catalog on Swedish Royal Technical Institute Ready

A catalog describing organization, staff, laboratories, and current research work of Royal Institute of Technology, Stockholm, Sweden, is now available through the department of commerce, office of technical services.

The institute's nine departments and over 100 divisions cover a wide range of scientific subjects, including subjects on physics, mechanical engineering, chemical engineering, mining, and metallurgy. The catalog is designated as PB 95881, and is obtainable through Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C.

Memorial for Sun Seamen To Be Built at Refinery

Sun Oil Co. has announced that a memorial to be erected at the entrance to the company's Marcus Hook refinery honoring the 141 seamen who lost their lives during World War II will be completed in the fall.

Names of the men who died at sea following German submarine attacks will be inscribed on bronze plaques on the sides of a granite pedestal supporting a bronze statue of a seaman.

Sun employes contributed $29,524 toward the cost of the $71,472 project.

New Sulfur-Recovery Plant Now in Full Operation

The $1,000,000 plant of Hancock Chemical Co., near Los Angeles, for recovery of sulfur from oil-refinery gases, is now in full operation, and its capacity is 100 tons a day of hydrogen sulfide.

The plant, only one of its kind in the United States, will process hydrogen sulfide from Richfield Oil Corp. and The Texas Co. refineries. President W. T. Hancock of Hancock Chemical said that a new unit, almost identical with the one now in operation, will be built in the near future. It should be in operation before the year is over.

The plant is a joint-ownership project with Hancock Oil Corp. and The Texas Co.

Winter Abates; Sinclair Refinery Back to Normal

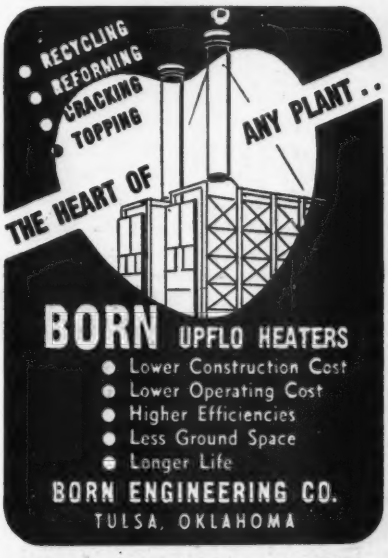
Movements of products from Sinclair Refining Co.'s plant at Sinclair, Wyo., are back to normal, after a tie-up due to below-zero weather that prevailed during the month of February. The refinery is the largest in the Rocky Mountain region.

M. H. Nolan, superintendent of the plant, reported more than 60 cars of refined oil moved out after the Union Pacific Railroad had cleared its tracks and was again hauling freight from southern Wyoming.

Tie-up due to weather forced the refinery to curtail runs to one-third of capacity. Normal operations resumed early this month.

Pension Increase Approved

Atlantic Refining Co., Philadelphia, announced adoption of a plan to make supplemental payments for a temporary period to employes who left active service prior to January 1, 1949, and who now receive retirement allowances. Extra payments, which are offsets to increased living costs, range from 5 per cent to 40 per cent of current retirement allowances.



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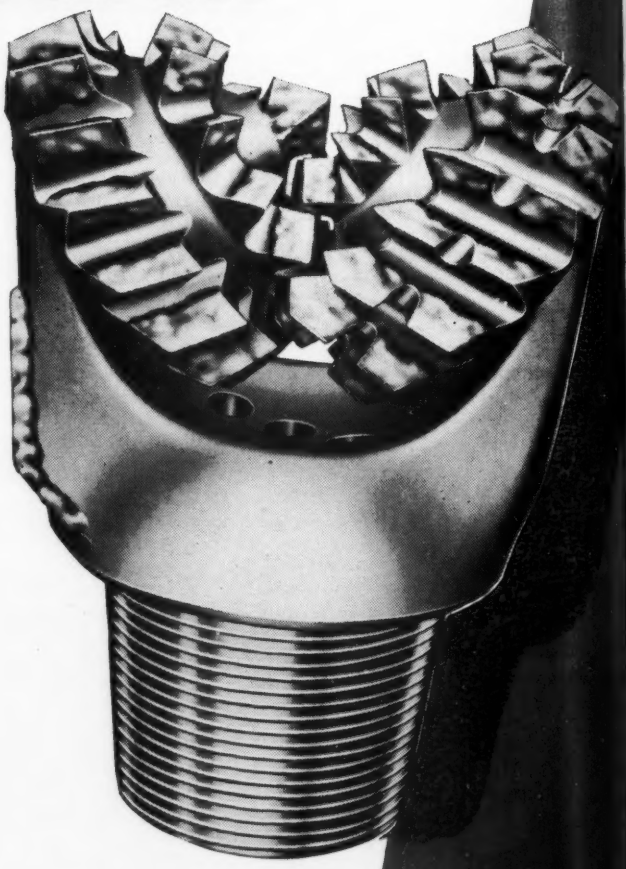

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Among the

Drilling Contractors

Active Rotary Rigs Total Increases Over January

The number of active rotary rigs operating at the end of February showed an increase over the preceding month, according to figures recently released by the Interstate Oil Compact Commission.

Most of the increase took place in the Gulf Coast section and the West Texas, New Mexico area where rigs in operation jumped from 1,041 to 1,164.

Totals by areas as of February 28 are as follows:

	Jan. 31	Feb. 28
Pacific Coast	191	194
Oklahoma, Kansas	314	310
Rocky Mountain (including W. Canada)	168	152
Ark., La., Tex.	166	148
West Texas, New Mexico	449	542
Gulf Coast	592	622
Illinois	61	79
Total	1,941	2,047

Personnel Is Subject of Second A.A.O.D.C. Institute

Valued insight into the vexing problem of personnel selection and training is being gained by drilling contractors attending the second in a series of six management institute forums sponsored in the Gulf Coast-Mid-Continent-Rocky Mountain area by the American Association of Oilwell Drilling Contractors.

The conference is led by Dr. P. J. Phillips, specialist in industrial training at the University of Texas, who is conducting sessions on personnel problems in Texas, Oklahoma, Mississippi, Louisiana, Indiana, Illinois, Kansas, Wyoming, and Colorado.

Another conference on cost factors in drilling is currently under way in the same area led by W. K. Powell, member of the A.A.O.D.C. Accounting Committee. A third session is scheduled to begin in San Antonio on April 5. Forrest Smith, specialist in supervisory training at the University of Texas, will discuss the subject: "Management Responsibility in Accident Prevention." Other sessions of the institute consider management organization and control, security, and legal position of the contractor.

A.A.O.D.C. Annual Meeting In Dallas in September

The American Association of Oilwell Drilling Contractors has selected Dallas as the site of the ninth annual meeting of the group to be held on September 19-21. Convention headquarters will be the Baker Hotel in that city. Decision to hold the conclave in Dallas was made by A.A.O.D.C. directors during their quarterly meeting.

Gathered at Beaumont for the commissioning ceremonies of the new Gulf Coast Drilling Co. barge, designed by Bethlehem Steel Co. and its subsidiary, Bethlehem Supply Co. for 15,000-ft. drilling in Gulf Coast waters are the above group. They are: L. A. Sunkel, manager of domestic production, J. R. Davidson, drilling superintendent, and John Marston, operations manager, all of Atlantic Refining Co., Dallas; R. H. Reeves, Mrs. Reeves, J. J. Rebstock, Mrs. Rebstock, E. C. Rechtin, general manager, Beaumont Yard, Bethlehem Steel Co., D. D. Strohmeier, vice president, shipbuilding division of Bethlehem Steel Co., and C. R. Zimmerman, vice president, Bethlehem Supply Co., Tulsa. Reeves and Rebstock are partners in Gulf Coast Drilling Co. First location for the new rig will be Atlantic Oil & Refining Co. 1 Corlin in St. Mary's Parish, Louisiana

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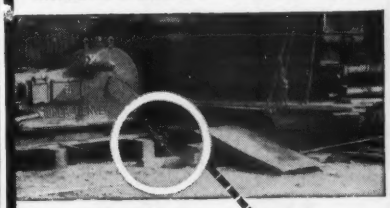

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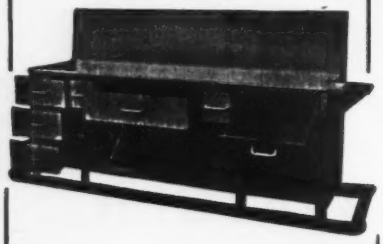

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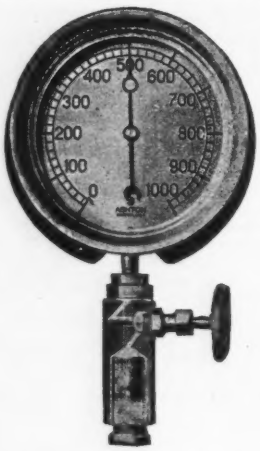

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Moutray-Moore Drilling Co. Abilene, Tex.

History—Moutray - Moore Drilling Co., owned by E. W. Moutray and Lamar H. Moore, began its operation in 1937 as Moutray-King Drilling Co. with two cable - tool rigs. King died in 1939, and Moore bought his interest in 1943. Two additional cable - tool rigs were purchased that year. Two of the company's rigs were sold in 1946 when a 5,000-ft. rotary rig was bought. The remaining two cable-tool outfits were sold the following year and Moutray-Moore secured two 7,500-ft. rotary rigs. Offices of the company are located at 1016 North Sixth Street, Abilene.

LAMAR H. MOORE

Personnel.—Lamar H. Moore, president and general manager; E. W. Moutray, vice president; Mrs. Martha B. Moutray, secretary; A. G. Hudgens, head tool pusher, and H. H. Knipe, tool pusher.

Sidelights. — Moutray-Moore operates in a 100-mile radius of Abilene. It drilled the discovery well for E. A. Hall in north Fisher County in 1946. Since that time the company has drilled 24 of the 43 wells in the field. All were contracted for 5,000 ft. It is presently drilling two more. Moutray-Moore has drilled wells in this field for Howard Bryant & Co., E. A. Hall, Round Top Oil Co., General Crude Oil Co., and The Texas Co.

B. and R. Drilling Co. and associates have started operations at 1 Seidel, NW NW SE 26-16-15, ½ mile southeast of the town of Galatia and 8 miles west of the Trapp pool in the northwestern corner of Barton County, Kansas. The Texas Co. and Carter Oil Co. are supporting the venture.

James C. Collins has contract for the Fisher-McCall Oil & Gas Co. 1 M. Walls, NW SW NW 20-10n-13w, Muskegon County, Michigan.

T & C Drilling Co. skidded the rotary rig from 1 Robertson second well in Susan Peak field of Tom Green County, West Texas, 1,320 ft. east to location for Plymouth Oil Co. 2 Robertson.

Regent Drilling Co. has contract to drill the 1 Central-Lac la Biche wildcat in LSD 14 20-69-13w4 on a 4,000-acre Crown reservation about 115 miles northeast of Edmonton on the northeast Alberta plains, Canada.

Carco Drilling Co. has contract for New Birmingham Development Co. 1 J. B. Dial in Jordan Survey, Cherokee County, East Texas. Work is scheduled to start immediately at the 5,300-ft. Woodbine exploration, located in the old Rusk field, 7 miles southwest of Rusk.

Muskegon Development Co. has contract to drill Gulf Refining Co. 6 T. F. Marston, C S½ SW SE 1-14n-4e, Bay County, Michigan.

Karels and Federspiel will drill 11 Imperial-Redwater in LSD 1, 32-57-21w4, in Calgary, Alta., Canada, using a rig new to Imperial operations. The well will be completed for natural gas to provide fuel for field operations.

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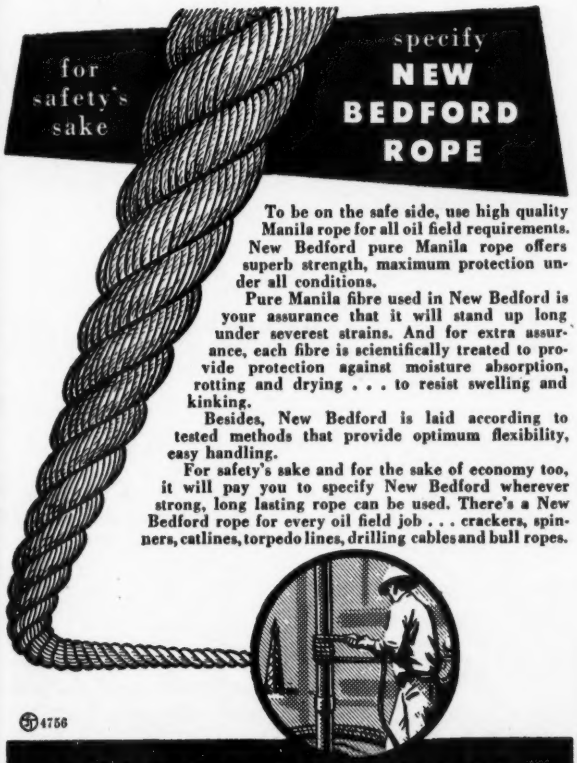

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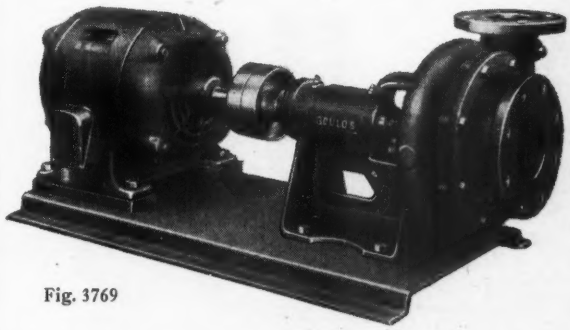

Fig. 3769

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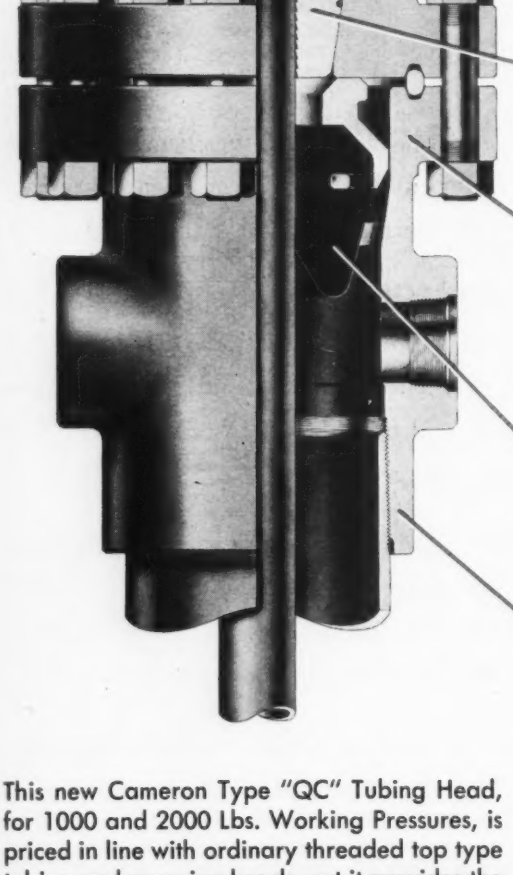

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Exploration and Drilling

West Texans Say "Watch Scurry County"

THE word from West Texas is that right now Scurry County is the hottest topic of conversation in many, many months. The optimists claim there are excellent possibilities that a limestone-reef field is shaping up that will be at least 18 to 20 miles long, several miles wide, and with an average oil column saturation of perhaps 300 ft.

The pessimists say these claims are exaggerated; instead of one mammoth field, there will be several separate fields, with oil-column saturations varying from thicknesses of 150 to 700 ft. The market prices being paid for royalties in some of the questionable areas would seem to indicate there are more optimists than there are pessimists.

From the south-end well in the area involved, Humble Oil & Refining Co. 1 Bishop, SW SW Section 164, Block 97, H&TCRR Survey to a group of wells in Section 440, same block and survey, known as the Standard Oil Co. of Texas Brown wells, there is a stretch of 18 miles in approximately a southwest-northeast trend.

Within this stretch of territory, since July 1948, oil has been discovered in a Pennsylvanian limestone reef at eight different spots. The buildup of interest might seem relatively slow for such a record, until the history of the first two wells is known. The first well was Sun Oil Co. 1 Schattel, in Section 186, Block 97, early in July 1948. Shortly thereafter Magnolia Petroleum Co. 1 Winston, Section 72, Kirkland and Fields Survey, about 4 miles east of the Sun discovery, came in.

After Sun's record of finding reef production in Coke County to the south, this attracted considerable attention. Both wells looked very encouraging in their initial tests. The area soon cooled off because of low dry-hole offsets to the Sun well, and the completion of the Magnolia well as a pumper.

Thus far the best-looking area is that around the Standard of Texas Brown wells, where almost 700 ft. of unbroken oil column is indicated. In the Lion Oil Co. McLaughlin area, in Section 197, some 15 miles southwest of the Brown wells, oil saturation may be as much as 325 ft. thick.

One of the bones of contention between the optimists and the pessimists is just how much consideration should be given to an old dry hole in Section 339, some 4 miles southwest of the Brown wells. This well was completed in January 1947 as a deep dry hole in the Ellenburger. The pessimists claim that this record proves the Brown area is cut off from the others. The optimists have several points to reinforce their arguments that the well does not condemn the connecting link area.

They say that in 1946 when this well was drilling, nobody was paying much attention to reef possibilities, or indeed to any kind of Pennsylvanian lime chances. If the Pennsylvanian prospects were considered, the main speculation was the likelihood of getting a good sand body in the right spot to have oil saturation. The main objective with almost everybody then was the Ellenburger, with a good eye being kept on Devonian prospects, and perhaps a slim chance of some Silurian. Unless special precautions were taken, the Pennsylvanian reef saturation might well have been drilled through without anything showing.

On that kind of reasoning, the area has been released, and it is rumored that a new well will soon be started. Royalties in the area adjacent to the old well are being bought at $250 to $350 per acre by the optimists.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ROCKY MOUNTAIN AREA.—Stanolind Oil & Gas Co.'s Tensleep sand new pay discovery at Beaver Creek, Wyoming, flowed 474 bbl. of 45.6°-gravity oil per day through ½-in. choke on test this week. Staining was logged by Ohio Oil Co. at its Hells Half Acre wildcat, Wyoming, in the Frontier formation. Operations have been resumed in the Mush Creek-Skull Creek area, Weston County, Wyoming, after severe winter weather, and Parker and Simmons will apparently extend the Skull Creek field 3 miles south after testing oil in the Newcastle.

WEST TEXAS.—Humble's 1 Bishop, Canyon limestone discovery in southwest Scurry County, was swabbed in without acid and flowed into pits at the rate of 19 bbl. of oil an hour. Magnolia Petroleum Co. 1-A TXL, Upton County discovery, started flowing tests on its second set of perforations in the Ellenburger.

SOUTHEAST NEW MEXICO.—Amerada 1-BTA State was hailed as an important discovery as it flowed approximately 185 bbl. of 46°-gravity Pennsylvanian oil, plus 72 bbl. of salt water, on a drill-stem test at 8,992-9,172 ft. Location of the new strike is northeast of the Caprock field in NW SE 2-12s-33e. Observers believed the water was coming from the bottom of the section, which could be cased off. The well was originally projected to 12,500 ft. to test the Devonian.

NORTH TEXAS.—Mid-Continent Petroleum 1 Killen, 3 miles southwest of Post Oak in Jack County, was creating considerable interest. It flowed oil on a drill-stem test of the Bryson sand (Strawn), then swabbed 63 bbl. of oil in 8 hours. Location is 6 miles northeast of nearest Strawn production.

SOUTH LOUISIANA.—According to latest reports, California Co.'s discovery of a giant salt dome flowed 255 bbl. of oil on initial test of perforations at 2,873-92 ft. The strike, 1 Louisiana State Lease 1366, is located in Block 2, Bay Marchand area, about 5 miles off the shore of Lafourche Parish in the Gulf of Mexico.

SOUTH LOUISIANA

Bay Marchand Tests Encounter Oil Sands

NEW ORLEANS.—California Co. 1 Louisiana State Lease 1366, located in Block 2 of the Bay Marchand area, Gulf of Mexico, offshore from Lafourche Parish, encountered sands showing oil saturation in broken sections from 2,679-2,910 ft. and is drilling ahead below 3,710 ft. The company's 2 Louisiana State Lease 1367 encountered the sands from 2,695-3,128 ft. and operators are drilling ahead below 3,834 ft. in sand with shale streaks. Each operation is projected to around 5,000 ft. No commercial producers have as yet been completed in Bay Marchand. Union Oil Co. of California drilled four tests on the shore line of the Bay Marchand Prospect, and the salt was penetrated near 8,650 ft.

The second test, completed by W. T. Burton, 1 Milton LeBlanc, has confirmed oil production on the southwest flank of West Tepetate field, Jefferson Davis Parish. The well is located approximately 1 mile off the southwest flank of West Tepetate producing field in 2-8s-3w. Total depth is 8,471 ft., with top of pay at 8,406 ft. Through a 9/64-in. choke, the well flowed 240 bbl. of 35°-gravity oil per day with flowing pressure on tubing at 1,075 psi. Gas-oil ratio is 390. Producion is through perforations at 8,406-08 ft.

Final gage for new oil sand opener in Eagan field, Acadia Parish, has been reported. Sun-Sohio Oil Co. 1 Limbocker Unit, 38-9s-1w, was completed for a potential test of 138 bbl. of oil per day through 7/64-in. choke, gas-oil ratio 776, tubing pressure 1,300 psi., gravity 38.5°. Total depth is 10,758 ft., and production is through perforations in new sand from 10,104-08.

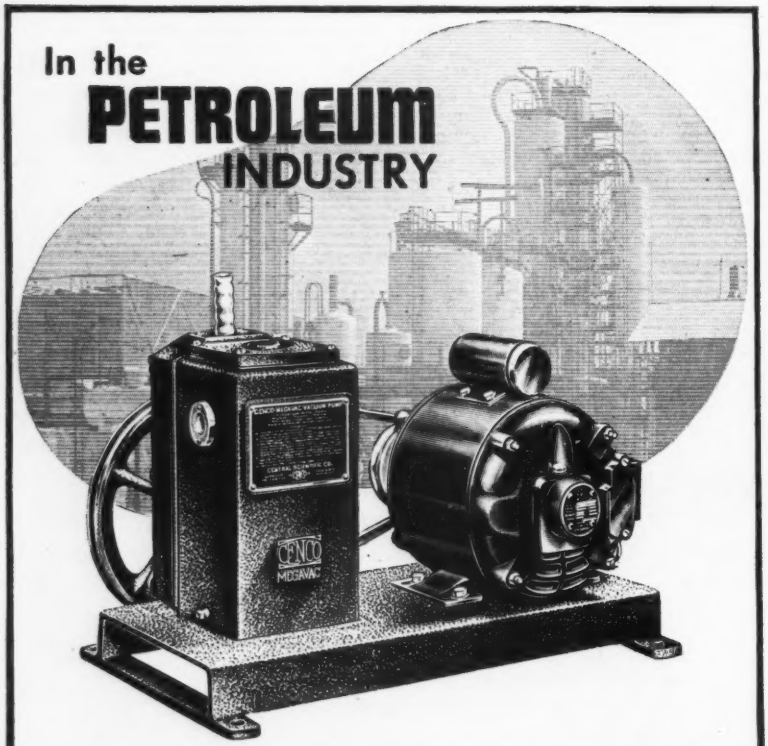
In University field, East Baton Rouge Parish, A. J. Bankhead et al 1 Bogan-Kennard Comm., 67-7s-1w, was completed flowing a potential of 190 bbl. oil per day through a ½-in. choke, through perforations at 9,491-94 ft. Total depth is 9,618 ft.

The 13 new locations for South Louisiana included 2 wildcat starts, both in Gulf of Mexico, 1 each offshore from Terrebonne and Vermilion parishes. One successful exploratory test opened a new oil sand in Acadia Parish.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Acadia Parish: New oil pay, Egan field—Sun-Sohio Oil Co. 1 Limbocker Unit, 38-9s-1w, TD 10,758 ft., top sand 10,104 ft., perforations 10,104-08 ft., IP: 138 bbl. oil per day through 7/64-in. choke, GOR 776, TP 1,300 psi., grav. 38.5°.

In the **PETROLEUM INDUSTRY**



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NEW YORK BOSTON SAN FRANCISCO NEWARK LOS ANGELES TORONTO MONTREAL

CALIFORNIA

San Ardo Field Reserves Extended by Two Wells

LOS ANGELES.—A substantial addition has been made to proved reserves in San Ardo field of Monterey County by the extension of Campbell pool production both to the northwest and northeast. The Texas Co. 7 Rosenberg, 2-23s-10e, 3,700 ft. northwest of present production, has been completed on the pump for 82 bbl. net oil in 18 hours and a cut of 28 per cent drilling fluid from plugged depth of 1,968. About the same distance northeast of production, Superior Oil Co. is preparing to place its 1 Orradre, 6-23s-11e, on the pump. Details are not yet available on depth of oil sand and result of formation tests, but production is assured, according to field reports.

Exploration in the Newhall townsite area of Los Angeles County, inspired by an oil discovery there several months ago, has been entirely unsuccessful to date and interest in the possibility of developing further production appears to have lapsed. Two miles to the east, however, a substantial development program has been under way in the Placerita Canyon area where a heavy-oil discovery was made in April 1948 by Nelson-Phillips Oil Co. New impetus will likely be given to drilling here by the completion last week of a 300-bbl.-a-day flowing well. All previous completions have been pumpers. The new well, J. Ramon Somavia and Yant, 1 Juanita, 31-4n-15w, is flowing 22.4°-gravity clean oil through a ⅜-in. choke from 1,830 ft. Some significance is attached to the fact that the gravity of the oil is about 6° higher than that produced in other wells in the area.

Locations were made this week for several important wildcats. Standard Oil Co. of California is preparing to drill 1 Walti, Section 34-21s-12e, in the Slack Creek area of Monterey County. This location, about midway between San Ardo and Coalinga fields, is of interest because of the prevailing theory that, since the finding of oil in the Cuyama Valley, further discoveries may be made along a northwest-southeast trend running through the valley and paralleling the line of fields extending from Midway-Sunset to Coalinga in the San Joaquin Valley.

Richfield Oil Corp. has made location for 1 Joice in Section 24-11n-28w. This will be an attempt to extend Russell ranch production still farther to the northwest following the recent completion of Hancock Oil Co.'s northwest outpost, 22 Wood-Callahan, ¼ mile to the southeast.

Interest in the area northeast of Blackwells Corner in Kern County is reviving with the staking of a wildcat location for 1 Beer, 8-26s-19e, by British-American Oil Producing Co. This falls about ½ mile northeast of a duster drilled 9 years ago

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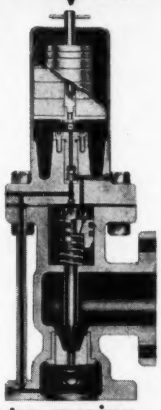

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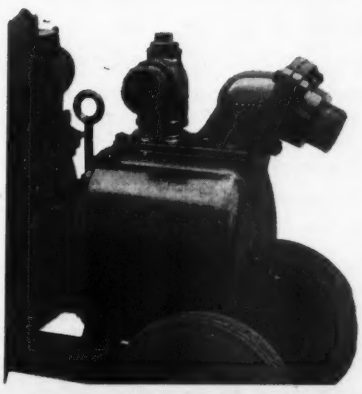

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by Texas Co., which was abandoned at 1,203 ft. after coring poor oil sand from 1,130-38 ft.

A ½-mile northerly extension of West Edison field is in prospect since United Oil Well Supply Co. cored a reported 27 ft. of good-looking oil sand at approximately 3,185 ft. in 1 DeMille-United-Drury, 8-30s-29e. Operator will core ahead to 3,284 ft. and run electric log before endeavoring to complete.

Another good completion in Guijarral Hills field of Fresno County adds to the impressiveness of this discovery made in August 1948 by Barnsdall Oil Co. Last week Barnsdall completed 42-2 Dessel, 2-21s-16e, flowing 1,000 bbl. a day of 37°-gravity oil through a 20/64-in. choke with 1,000 psi. on the tubing and 500 psi. on the casing. Production here is from Leda sand of Oligocene age.

CALIFORNIA WILDCAT FAILURES

Orange County, West Newport area: McCarthy Oil & Gas Co., 32 Lamb Community, 6-6s-10w, dry, elev. unknown, TD 6,442 ft.

Kraemer area: Honolulu Oil Corp. 1 Bryant, 29-3s-8w, dry, elev. unknown, TD 3,705 ft.

Los Angeles County, Newhall area: Eagle Oil & Refining Co. 1 Newhall, 34-4n-16w, dry, elev. 1,285 ft., TD 6,236 ft.

Elsmere area: Solemint Petroleum Corp. 1 Carlisle, 27-4n-15w, dry, elev. 1,700 ft., TD 1,415 ft.

San Bernardino County, Cajon area: Cajon Oil Co., Ltd., 2 Ray, 36-3n-6w, dry, elev. 300 ft., TD 3,740 ft.

Ventura County, Point Magu area: Van Noy Drilling Co., Inc. 1 Broome, 33-1n-21w, dry, elev. unknown, TD 1,345 ft.

Magu Oil Co. 1 Ventura County Game Preserve Association, 1-1s-22w, dry, elev. 14 ft., TD 1,872 ft.

Santa Barbara County, Cuyama Valley area: Bishop Oil Co., 16 Russell, 33-11n-28w, dry, elev. 2,112 ft., TD 2,530 ft.

Fugler Point area: Union Oil Co. 1-35 N. L. & F. Co., 35-10n-33w, dry, elev. 359 ft., TD 3,228 ft.

Tulare County, Ducor area: McCarthy Oil & Gas Co. 1 Smith, 5-24s-27e, dry, elev. 569 ft., granite 2,460 ft., TD 2,494 ft.

San Luis Obispo County, Cuyama Valley area: Richfield Oil Corp. 4 Indian, 23-11n-28w, dry, elev. 1,755 ft., TD 3,434 ft.

Kern County, Ant Hill area: Maurer and Fisher, 4A Linda, 11-29s-29e, dry, elev. 635 ft., TD 1,315 ft.

Tejon Hills area: Tejon Hills Co. 11 Tejon Hills, 10-11n-18w, dry, elev. 995 ft., TD 448 ft.

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TEXAS GULF COAST

Rudco Opens New Oil Field in Bee County

HOUSTON.—A new oil field for Bee County has been opened by Rudco Oil & Gas Co. 1 M. McFall Kerbey et al, located approximately ½ mile northeast of the Bee-Live Oak County line and 4 miles west-northwest of Yoward field, in Thomas B. Reese Survey, A-281, 6 miles southwest of Mineral. Total depth is 7,553 ft., and the well flowed at the rate of 100 bbl. of oil per day through a ⅛-in. choke, with 525 psi. working pressure after acidizing. Well was shut in for storage before running potential gage. Production is through perforations at 7,019-25.

Potential gage has been run in Placid Oil Co. 1 Robble Wells, discovery well of a new oil field approximately 2 miles southeast of Fannin townsite and 2¼ miles north of the old Fannin gas field. The well flowed 85 bbl. of oil per day, 25°-gravity pipe-line oil, with 400 psi. tubing pressure and 1,450 psi. casing pressure. Gas-oil ratio is 400. Production is through perforations at 3,721-29 ft. This well is in the Juan Rener Survey. Placid now is drilling its 1 Swickheimer et al as an east offset to this well.

Sunray Oil Corp. 1 P. H. Breeden, new discovery well in Goliad County, is preparing to dual complete. Total depth is 8,210 ft. Casing was set and perforated first at 5,082-94 ft., where drill-stem test, using ¼-in. chokes, open 1½ hours, flowed gas at the rate of 2,000,000 cu. ft. per day with a spray of condensate, and recovered 15 ft. of condensate plus 255 ft. of condensate-cut mud. Bottom-hole flowing pressure was 2,770 psi. Plug was set at 5,026 ft., and perforations made from 4,644-54 ft. in the upper sand (Yegua zone). Drill-stem test developed 1,600 psi. working pressure through these perforations, using ¼ and ⅛-in. chokes, and flowed gas with small amount of condensate. Both these sands had showed good for gas-condensate production in drill-stem tests run in open hole prior to setting pipe. This new discovery is 2 miles southeast of Weesatche townsite, in the Joseph Simons Survey A-253.

Eight wildcat starts were included in the 36 new locations reported for Districts 2 and 3, 2 wildcats in Bee, and 1 each in Calhoun, Goliad, Madison, Newton, San Jacinto, and Wharton counties. Three successful exploratory tests were completed, two in Bee and one in Goliad counties, while five were dry, two in Fort Bend and one each in Jackson, Liberty, and Victoria counties.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Bee County: New gas-condensate pool—Dirks Bros. & Tide Water Associated Oil Co. C-2 C. A. Dugat, in James Gray Sur., 1 mi. W of Dirks field and 1½ mi. SW of West Cosden-Mackhank field, top pay 7,530 ft., TD 7,557 ft., perf. 7,530-38 ft., IP: 12,500,000 cu. ft. gas per day on open flow, gas-condensate ratio 35,000.

New gas pool: Warren Oil Corp. 1 McCurdy-Moss, in Maxino Gomez Sur., 5½

mi. SW of Blanconia and 1 mi. SW of South Blanconia field, top pay 2,518 ft., TD 5,388 ft., perf. 2,518-25 ft., IP: 3,000,000 cu. ft. dry gas per day through ⅛-in. choke, TP 1,075 psi., CP 1,100 psi.

Goliad County: New oil pool—Placid Oil Co. 1 Robbie N. Wells, in Juan Rener Sur., 2 mi. SE of Fannin townsite and 2¼ mi. N of Fannin gas field, top pay 3,721 ft., TD 4,815 ft., perf. 3,721-29 ft., IP: 85 bbl. oil per day through a ⅛-in. choke, GOR 400, TP 400 psi., CP 1,450 psi., Gr. 25°.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Fort Bend County: R. A. Irwin et al 1 Mellinie B. Settegast, in E. P. White Head Sur., 5 mi. N of Rosenberg, dry, TD 7,808 ft.

The Texas Co. 12 Huebert Hausler et al, tr. 1, in Barnabus Wickson Sur., approximately 1 mi. off SW flank of Big Creek dome, dry, TD 1,467 ft. in salt.

Jackson County: Delhi Oil Corp. 1 Culberson & Woodall, in Ramon Musquiz Gr., 9 mi. S of Edna and 2½ mi. N of La Salle field, dry, TD 5,206 ft.

Liberty County: W. F. Newton et al 1 Whitten, in H&TC Sec. 98, 5 mi. N of Cleveland, dry, TD 5,363 ft.

Victoria County: Fidelity Oil & Roy. Co. 1 Frank Beck, Jr., in J. M. Cobarrubias Sur., A-9, 9 mi. SW of Victoria, dry, TD 5,034 ft.

MISSISSIPPI

Clarke County Well Tests After Show of Oil Sand

JACKSON.—Dan L. Reynolds 1 Board of Supervisors, 16-2n-14e, 1½ miles south and ½ mile east of the town of Pachuta, in Clarke County, is preparing to run drill-stem test after coring a show of oil in lower Tuscaloosa section. Top of Midway was picked at 2,630 ft., top chalk at 3,170 ft., and top of Eutaw at 4,002 ft. Cored from 5,384-94 ft., it recovered 4 ft. of shale and 4 ft. of gray-green, fine-grained, porous, shaly sand with good odor, spotted stain, and spotted fluorescence. Recovery from core 5,394-5,404 ft. was 6½ ft. of sand as above, 1 ft. of dark gray hard shale, and 1½ ft. of sand with good ordor, spotted stain, and good fluorescence. Operators are still testing.

Vaughey & Vaughey-Big Chief 1 J. M. Seab, 12-6n-2e, in Roxie field area, Franklin County, continues to test through perforations at 10,623-25 ft. opposite the upper sand stringer in the lower Tuscaloosa section. Lower perforations are shut in until a treater can be installed. On last test the well flowed 69 bbl. in 24 hours, flowing casing pressure 550 psi. Gravity of oil is 39.6°. Shut-in tubing pressure on lower perforations has remained at 2,150 psi.

The Bude field discovery well, Barnsdall Oil Co. 1 J. A. Pittman, 29-5n-4e, Franklin County, was opened up last week and flowed at the rate of 650 bbl. per day. On the second day of flowing at this rate the well started producing 2 per cent salt water. The well was then choked back on 11/64-in. choke and flowed at the rate of 330 bbl. per day and salt water decreased to 1 per cent.

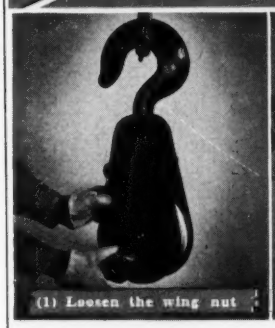
Honolulu Oil Corp. has derrick complete for a test in SW SW 16-5n-4e, located approximately 1½ miles north and 1 mile east of the discovery well of Bude field.

In Baxterville field, Marion County, Gulf Refining Co. 1 Amanda Von G. Gex, 36-2n-17w, has been completed pumping 79 bbl. per day of 13.8°-gravity oil. Total depth is 8,876 ft.

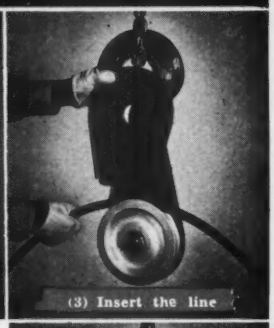
Two wildcat locations were reported for Mississippi this week, one each in Copiah and Franklin counties. Four development locations were shown, one each in Brookhaven, Bude, Mallalieu, and Ovett fields. Two wildcat failures were completed, one each in Humphreys and Noxubee counties.

MISSISSIPPI WILDCAT FAILURES

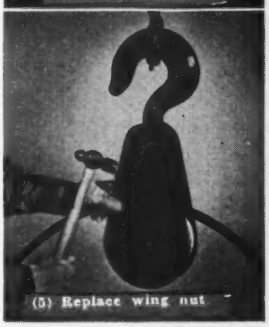
Humphreys County: Claypool & Creighton


(1) Loosen the wing nut

(2) Raise the side


(3) Insert the line

(4) Drop the side


(5) Replace wing nut

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1 T. F. Cartwright, C NW NE 13-14n-4w. dry, TD 5,008 ft. Tops: Tuscaloosa 4,005 ft., gravel 4,213-4,406 ft., igneous 4,539-69 ft., Lower Cretaceous 4,875 ft.

Noxubee County: Homer Price 1 W. H. Cooper Estate, SE SE 21-15n-19e, dry, TD 5,011 ft.

GEORGIA WILDCAT FAILURE

Seminole County: Mont Warren 1 W. E. Harlow estate, 27th Land District, Lot 82, dry, TD 3,554 ft.

ROCKY MOUNTAIN

Beaver Creek Deep Test Finds Pay in Tensleep

DENVER. — Stanolind Oil & Gas Co.'s first deep test in Beaver Creek field flowed 474 bbl. of 45.6°-gravity oil per day through ½-in. choke. The well is 11 Unit, CN½ SE 10-33n-96w, Fremont County, Wyoming, and went to 10,903 ft., total depth, in the Amsden formation. Tensleep was topped at 10,442 ft. and Amsden at 10,894 ft. The well logged 454 ft. of saturated Tensleep sand, and although portions of the sand were hard and tight the well flowed oil on drill-stem tests of this formation. This new pay discovery was scheduled to test Madison prior to completion, but the operator has decided to complete at the present depth and test the Madison at a later date. This field is northwest of Sand Draw field, where nine Tensleep oil wells have been completed and a recent Madison well tested water in that formation. Stanolind drilled the first well in Beaver Creek field in 1938, with the well completed as a gas discovery in the Lakota formation. There are now 10 Lakota sand producing wells and the present well is the first below the Morrison.

Top of Frontier was logged at 5,107 ft. by Ohio Oil Co. at 1 Boston-Government, NW NE NE 32-36n-85w, in the Hells Half Acre area, Natrona County, Wyoming, and staining was cored in that formation. Ninety feet of gas-cut mud was recovered in 30 minutes on drill-stem test at 5,111-35 ft., and three subsequent tests also showed slightly gas-cut mud in the Frontier. The formation was reported as tight and the staining light in a 15-ft. core. Although not commercial at the present depth, the recovery of stained cores in the Frontier at this wildcat is considered of importance for future activities in the eastern Wind River Basin area. The well is 2 miles north of Boone Dome, which has produced gas from the Shannon sand and has been tested to Mowry at 5,192 ft.

A well of interest in southern Montana is scheduled by Union Oil Co. and Stanolind Oil & Gas Co. at Mackay Dome, Carbon County. The well will be 1 Mackay, NE SE SW 13-6s-17e, and will be drilled to Madison at around 5,500 ft. Union made a farm-out deal with Stanolind on a block covering this structure, and will be operator of the well. Ohio Oil Co. drilled a Lakota test at Mackay Dome in 1926 and this wildcat went to 3,638 ft., total depth, and had shows of oil and gas in the Dakota.

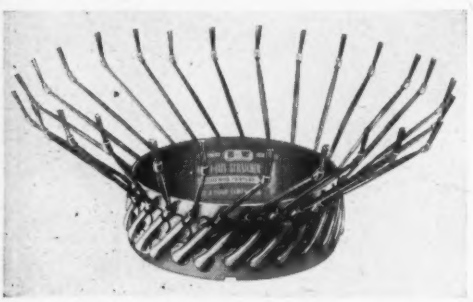
Operations are again being resumed in the Mush Creek-Skull Creek area, Weston County, Wyoming, after 6 weeks of severe winter weather. An apparent extension to Skull Creek field is being completed by Parker and Simmons at 1 Wright, SW NE SW 24-44n-62w, 3 miles south of present production. The well topped Newcastle at 2,936 ft. and the operator is running casing at 2,940 ft., total depth. On 10-minute drill-stem test at 2,933-40 ft. the well made 150 ft. of oil, 30 ft. of oil-cut mud, and gas was recovered at the surface in 10 minutes. At Northwest Lodgepole, 20 miles northwest of Mush Creek, Esperado Mining Co. 1 Government, C SE SW 16-45n-67w, has been plugged back and casing cemented at 7,488 ft. after the operator tested water in the Lakota sand. Dakota was found at approximately 7,493 ft. and on tests this formation showed oil and water. A cement plug was run to the base of the casing and the operator is reported preparing to drill a few feet of this and shoot the well prior to additional testing. Shows of oil were also reported in the Newcastle, between 7,294-7,300 ft. Additional producers are being completed at Fiddler Creek, further extending the producing area in this field.

New locations.—There were 10 new locations, including 7 in Wyoming, 1 in Colorado, and 2 in Montana. At Little Sand Draw field, where Husky Refining Co. and Seaboard Oil Co. made a recent Tensleep discovery, location has been made for a new test at 2 Government, NW SW NW 2-44n-96w, Hot Springs County, Wyoming. Other locations were for pool wells.

Completions.—Thirteen wells were completed with a total daily initial of 1,766 bbl. of oil. Nine of the completions were in Wyoming, two in Montana, and two in Utah. In Wyoming, Argo Oil Corp.'s Madison new pay producer at Hamilton Dome was completed for the initial swab gage of 25 bbl. of oil per hour. The oil is 14.4° gravity, and total depth 3,506 ft. in the Madison. The well has been shut in pending installation of pumping equipment. Two wildcat failures in the Salt Basin of Utah have been completed. Amerada Petroleum Corp.'s Green River wildcat reportedly tested salt water with gas on completion, but widely circulated rumors credited the well with making gas and distillate prior to abandonment as a junked hole. No confirmation of this was made by the operator and an offset well has been started. Pure Oil Co. abandoned its first test at Northeast Salt Valley, Grand County, at 3,036 ft. in Paradox salt.

WYOMING SUCCESSFUL WILDCAT

Hamilton Dome, Hot Springs County: Argo Oil Corp. 41-T Placer, SE NE SE 14-44n-98w, 3,506 TD, swabbed 25 bbl. oil per hour. Sundance 666, Gypsum Springs 992, Chugwater 1,120, Dinwoody 2,260, Phosphoria 2,324, Tensleep 2,550, Amsden 2,866, Madison 3,105.



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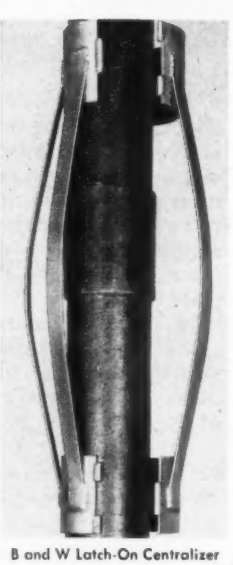

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UTAH WILDCAT FAILURES

Green River, Grand County: Amerada Pet. Corp. 1 Unit, SE NW NW 2-22s-16e, 5,645 TD, abnd., Hermosa 3,155, Paradox 4,820, Paradox Salt 5,100.

Northeast Salt Valley, Grand County: Pure Oil Co. 1 Unit, SW SE NW 2-23s-20e, 3,036 TD, abnd., Paradox 2,480.

CANADIAN FIELDS

Imperial-Schoepp Test Recovers Oil, No Water

CALAGARY.—The thickness of the D3 zone of the Devonian at Imperial-Schoepp oil strike has been further increased, with 11 ft. of water-free oil pay currently open. The Schoepp discovery is expected to mark the beginning of a new oil field, named Golden Spike after the small post office located a mile southwest of the well.

Coring and testing at 5 and 10-ft. intervals has been carried out the past few weeks, with oil flowing to the surface on each test and substantial recoveries of oil attained from the drill pipe. No water has yet showed. The well, located in LSD 9, 2-51-27w4, about 4½ miles west of the current producing boundaries of the Woodbend field, is now at 5,483 ft. with a drill-stem test in progress.

Leduc.—Leduc-Calmar 1, LSD 5, 25-49-26w4, southeast Leduc area test, ran its first successful drill-stem test in the D2 zone of the Devonian. A 1-hour test of the interval at 5,238-53 ft. gave a maximum natural gas flow rate of 189,000 cu. ft. daily, plus a pipe recovery of 900 ft. of clean crude oil and 200 ft. of drilling mud. After coring another 10 ft. to 5,263 ft., the added section of fairly tight lime was tested, giving a gas flow rate of 50,000 cu. ft. daily, plus a 130-ft. rise of oil-cut drilling mud. This test, that may quite possibly mark the start of still another oil pool in the Leduc region, lies 2½ miles east and 1 mile south of the South Leduc pool opened last year by Okalta Oils. A dry hole separates the two areas.

Black Diamond.—Whether commercial possibilities exist at the Anglo-Black Diamond test, 18 air miles south of Calgary, should be determined soon after further acidization has been carried out. Three acid treatments have been made so far, with the past week's results showing small quantities of oil with no sign of formation water. The well, located in LSD 12, 12-20-2w5, had drilled to 9,309 ft. in the lower porous zone of the Madison limestone and found water. The hole has since been plugged back to the upper porous horizon and acidizing and testing being carried out.

Whitemud.—Imperial - Whitemud 1, LSD 15, 14-51-26w4, 4 miles east of Leduc-Woodbend's lower Cretaceous oil pool, ran another drill-stem test in the basal Cretaceous at 4,171-88 ft. The 20-minute test gave a pipe recovery of 900 ft. of gas-cut mud and 2,100 ft. of sulfur water. An earlier test in the Cretaceous interval at 4,062-97 ft., gave a gas flow rate of 390,000 cu. ft. daily, plus a blow of oil at the surface, and pipe recovery of 815 ft. of crude oil and 485 ft. of salt water in 34 minutes.

Bon Accord.—Imperial-Bon Accord 1, indicated oil discovery in the D2 Devonian, ran a drill-stem test in the D3 equivalent and recovered 1,080 ft. of gassy, salty sulfur water. The 17-minute drill-stem test was made at 3,835-51 ft. Coring and testing will continue a short distance, after which the hole will likely be plugged back for production tests in the D2 zone, where the well found limestone porosity with about 25 ft. of oil column above the water line. A test from 3,585-3,608 ft. brought a flow of 35°-gravity oil to the surface in 39 minutes. Water was present in a test run immediately below this section. Bon Accord is located in LSD 1, 29-56-22w4.

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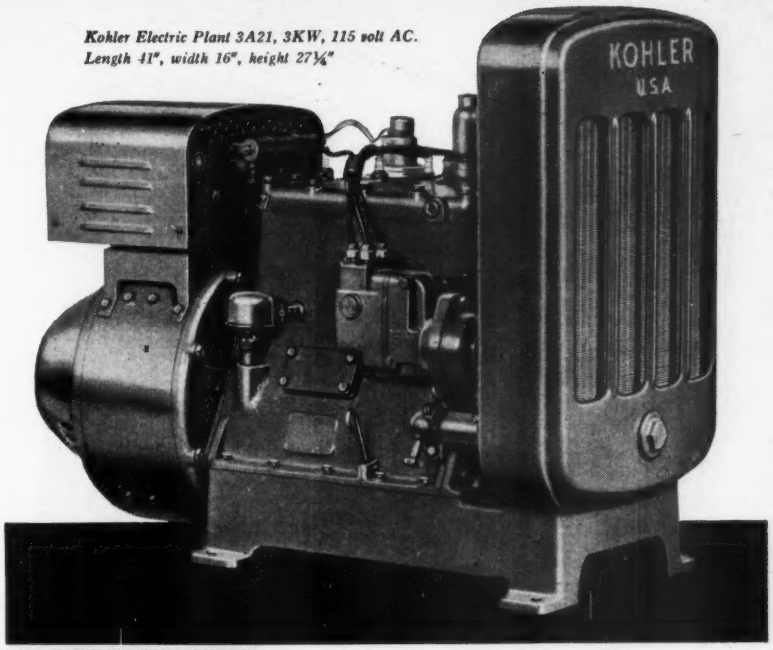

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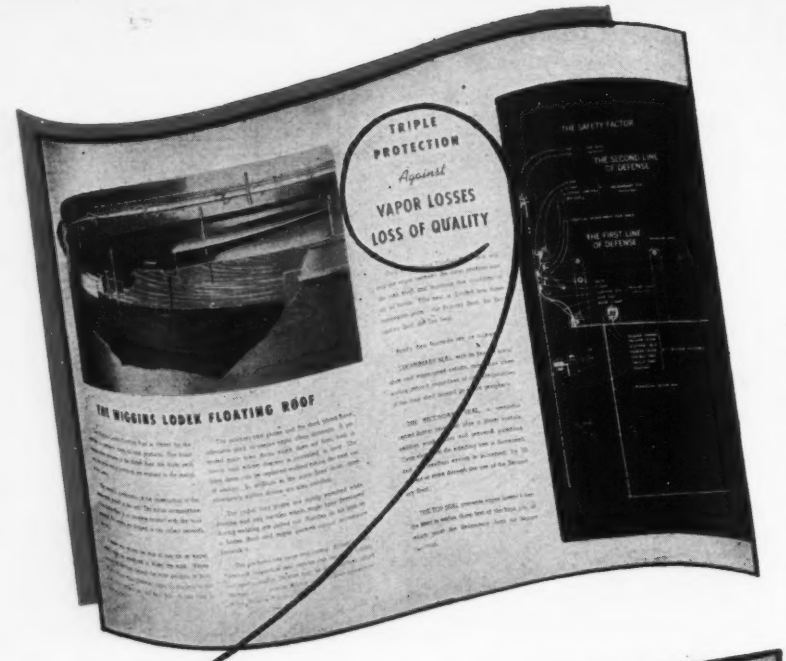

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Write for bulletin FR-3 which gives further details on Wiggins Lodek Floating Roofs.

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OKLAHOMA

Elk City Well Gets Oil From Second Zone

SHELL OIL CO., INC. 1 Kelly, C NE SW 23-10n-21w, Beckham County, is testing the second zone after making 130 bbl. in 6 hours through perforations at 10,130-80 ft. The second zone to be tested is opposite perforations at 9,610-40 ft. With packer set at 9,574 ft., the well had gas in 27 minutes and fluid in 8½ hours. After flowing to pits for 30 minutes, the well was turned to tanks and made 25 bbl. in 7 hours. Since the oil was accompanied by mud and water, the well was turned back to pits.

The once abandoned well in Washita County, Max Pray et al 1 Proctor, C NW 28-10n-20w, continues testing and is reported to be making about 10 bbl. of fluid per hour, cut about 50 per cent with water, mud, and emulsion. Production is through perforations at 9,615-9,707 ft.

Development increases in the recently opened Happy Valley pool, Lincoln County, as two new tests are announced. Foster Drilling Co. has announced location for 1 John Dethloff, NW NE SE 25-17n-5e, and R. L. Kemp will drill a ½-mile outpost at 1 Haskins, SW SW SW 19-17n-6e. The Dethloff well is three locations east of the discovery well. The east offset to the discovery well, Foster 2 Deacon, is shut down for tanks after making 51 bbl. per hour on a 3-hour test of the Bartlesville at 3,400-20 ft.

The recently opened Northwest Mount Hope pool in Payne County is getting a confirmation well and extension. The Texas Co. 1-L State School Land, NE NE SE 36-19n-3e, made 95 bbl. in 24 hours from a total depth of 3,754 ft. The discovery well was Texas 1-J School Land, NE NE NE of Section 36.

In the area between Marshall and Lovell fields in Logan County, J. H. Snowden et al 1 Fry, C NW NW 4-18n-4w, is proving for a producer from the Tonkawa sand. The sand was topped at 4,012 ft. and the best drill-stem test was at 4,052-72 ft. With tool open 70 minutes, the well had gas in 18 minutes and recovered 600 ft. of oil and 150 ft. of oil-cut salt mud. Hole was drilled to 4,962 ft. and plugged back to 4,200 ft. with casing set at 4,140 ft. Casing was perforated at 4,054-59 ft. and well flowed 92 bbl. of oil and 3 bbl. of water in 14 hours. Tanks are being installed.

OKLAHOMA SUCCESSFUL WILDCATS

Carter County: The Texas Co. 1 Brady, NW NW NW 22-1s-3w, flowed 1,210,000 cu. ft. of gas through open 2-in. tubing from sand at 2,783-2,818 ft., TD 3,650 ft., PB 2,820 ft.

Noble County: Mazda 1 Merriman, SE SE NW 26-22n-2w, flowed 192 bbl. of oil per day from Marshall at 5,117-46 ft., TD.

Stephens County: Wooley 1 Sledge, SE NE NE 26-2s-6w, flowed 5,535,000 cu. ft. of gas from Arbuckle at 2,364-2,430 ft., TD. (Geological wildcat).

OKLAHOMA WILDCAT FAILURES

Creek County: Mid-Continent 1 Watson, NW SE NW 15-14n-9e, dry, TD 3,736 ft., Oswego 1,980 ft., Prue 1,984 ft., Verdigris 2,052 ft., Skinner 2,168 ft., Bartlesville 2,628 ft., lower Bartlesville 2,740-71 ft., Dutcher 3,030-40 ft., Wapanucka 3,114 ft., Mississippian Caney 3,210 ft., Sylvan 3,622 ft., Viola 3,672-3,720 ft., Wilcox 3,724-28 ft.

Kiowa County: Warlick 1 Turner, SE SE NW 36-3n-15w, dry, TD 460 ft., no shows.

LeFlore County: Arkansas-Oklahoma Gas Co. 1 Warlick, SE NE NE 30-10n-26e, dry, TD 6,261 ft., basal Atoka shale and sand 6,097-6,114 ft., shale with sand streak 6,124-28 ft., shale and sand 6,128-32 ft., shale with sand streaks 6,152-60 ft., sand and shale 6,160-71 ft., sand 6,181-6,213 ft., sand and shale 6,213-24 ft., Atoka shale 6,224-61 ft.

McClain County: Harper 1 Ward, NE NW NE 1-5n-2w, dry, TD 8,145 ft., Hogshooter 5,812 ft., Checkerboard 6,030 ft., lime 6,270 ft., Gibson sand 6,760 ft., Stephens 6,930 ft., basal Pontotoc and Woodford 7,070 ft., Hunton 7,170 ft., Sylvan 7,415 ft., Viola 7,540 ft.

Payne County: Southern 1 State, SE SE NW 36-19n-1w, dry, TD 5,445 ft., Hogshooter 3,400 ft., Layton 3,690 ft., Checkerboard 4,050 ft., Oswego 4,450 ft., Mississippi lime 4,937 ft., Woodford 5,090 ft., Misener 5,139 ft., Sylvan 5,180 ft., Viola 5,227 ft., Wilcox 5,320 ft., second Wilcox 5,430 ft.

Sequoyah County: Arkansas-Oklahoma Gas Co. 2 Brant, NW NW NE 24-10n-25e, dry, TD 6,267 ft., basal Atoka sands 5,850-5,903 ft., 5,903-34 ft., 5,948-6,026 and 6,042-73 ft., sandy shale 6,193-6,367 ft.

MICHIGAN

Stevens Testing Wildcat In 2,000-Acre Block

MOUNT PLEASANT.—Norman L. Stevens 1 Rivard, SE SW NW 31-1n-15w, Lee Township wildcat, Allegan County, was being tested in the Traverse following acidization with 1,000 gal. On initial tests after acid, as much as 160 bbl. of net fluid, mostly oil, was recovered the first 8 hours by swabbing. Travers lime top was logged at 1,169 ft. and hole was bottomed out at 1,172 ft. with 350 ft. of free oil showing natural in 12 hours. Pumping unit and tank storage were being installed for further tests, while Stevens had moved drill to the west 10-acre offset location to start drilling a new test. Stevens controls about 2,000 acres of leases surrounding new test, while Superior Oil Co., with a block lying mainly to the south of the Rivard test, has lease to the south 40-acre offset lease.

Socony-Vacuum Oil Co. 1 Wolverine Power Co. Arehart, SW SE SE 2-17n-1e, Billings Township wildcat, Gladwin County, was being tested in the Dundee following acidization with 500 gal. Natural, approximately 49 bbl. of oil was recovered in 2½ days by swabbing. Wildcat is being tested in the Dundee at a total depth of 3,558 ft.

The area in Golden Township, Oceana County, which was recently opened to development for Dundee oil production by McClanahan Oil Co. and George F. Herr 1 Dykstra, NE SE NE 34-15n-18w, wildcat Dundee flowing well, has been named the "Mears pool" by mutual agreement of the field operators, Department of Conservation, and Michigan Oil and Gas Scouts Association.

MICHIGAN SUCCESSFUL WILDCATS

Kalamazoo County, Alamo Township: Ashby Oil & Gas Co. 1 Williams et al, NW NW NE 30-1s-12w, Traverse 1,308 ft., 10 bbl., TD 1,314 ft.

Oceana County, Golden Township: McClanahan Oil Co. and George F. Herr 1 Dykstra, NE SE NE 34-15n-18w, Dundee 2,200 ft., 240 bbl. pinched after acidization, TD 2,211 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Lee Township: Ohio Oil Co. 1 Newman, SE NE SE 3-1n-15w, Traverse 1,266 ft., dry, TD 1,302 ft.

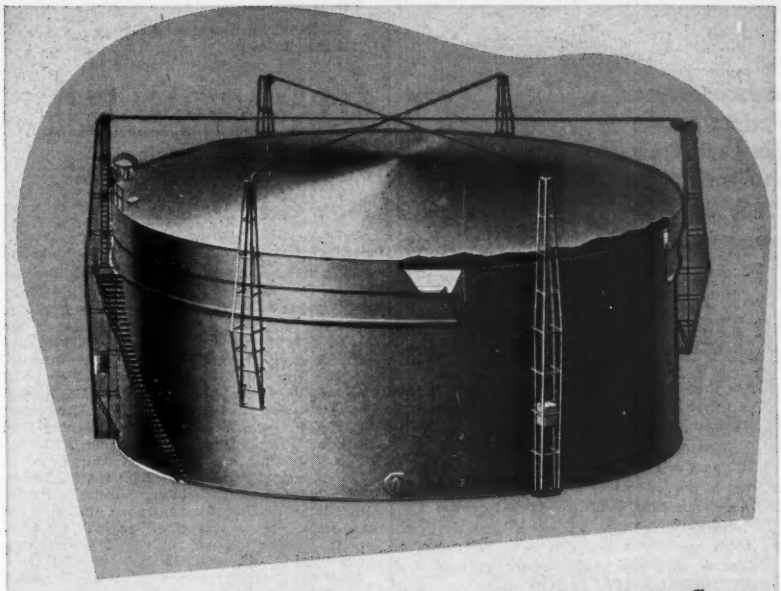
Salem Township: Louis Zellman 1 Giawiski, NE SW NE 36-4n-13w, Traverse 1,675 ft., dry, TD 1,680 ft.

Valley Township: Ohio Oil Co. 1 Jones et al, SE SE SW 34-2n-14w, Traverse 1,317 ft., dry, TD 1,353 ft.

Valley Township: Ohio Oil Co. 1 Setterberg, NW NW NW 21-2n-14w, Traverse 1,323 ft., dry, TD 1,360 ft.

Kent County, Plainfield Township: Marvel Production Co. 1 Koets, SE NW SW 35-8n-11w, Traverse 2,196 ft., dry, TD 2,205 ft.

Oceana County, Benona Township: Turner Petroleum Corp. 1 Ruckel, NW SE NE



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COUNTER BALANCE SYSTEM	1 — Reduces operating pressure to 1¾" water. 2 — Reinforcement of interconnected tanks not required. 3 — All mechanism completely accessible from outside. 4 — Not affected by out-of-level tank grade. 5 — No lubrication required.
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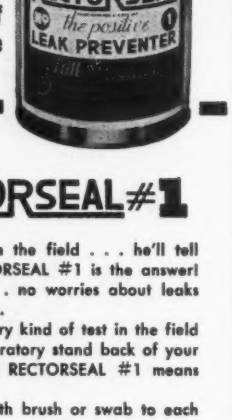

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12-14n-19w, Dundee 2,245 ft., dry, TD 2,285 ft.

APPALACHIAN FIELD

United Carbon Wildcat Tests Gas, Drills On

PITTSBURGH.—In Steele district, Wood County, West Virginia, United Carbon Co. et al 2-1582 Godfrey L. Cabot, Inc., Kerr Tract, elevation 733 ft., reached the Oriskanv sand at 4,805 ft. with gas in the top of this formation gaging 1,295,000 cu. ft., with drilling continuing. In New Interest district, Randolph County, South Penn Oil Co. 1 J. W. Isner, elevation 1,973 ft., logged the Oriskany sand at 1,730 ft. In Kingwood district, Preston County, Hope Natural Gas Co. 9209 Frank Barlow, elevation 2,235 ft., is endeavoring to straighten the hole at 8,265 ft., recording the Oriskany sand at 8,259 ft. In Grant district, Wayne County, United Fuel Gas Co. brought in a good gas well, the 1-6477 fee, gaging 3,291,000 cu. ft. of gas natural in the Maxon sand, with total depth at 1,312 ft.

New locations reported in West Virginia were 16: Union district, Barbour County; West Union district, Doddridge County; Union district, Jackson County; Union district, Kanawha County; Harts Creek district, Lincoln County; Sandhill and Webster districts, Marshall County; Curry district, Putnam County; Grant, Lincoln, and Stonewall districts, Wayne County; Grant district, Wetzel County; Clay district, Wirt County; Baileysville district, Wyoming County.

In Georges Township, Fayette County, Pennsylvania, The Manufacturers Light & Heat Co. 8 Barton Heirs, lost another string of tools in the fishing job at this well and is drilling by at a depth of 10,295 ft. The depth originally reached was 10,312 ft. In Napier Township, Bedford County, South Penn et al, Snee & Eberly 1 Jesse B. Miller is drilling at 2,958 ft. In Derry Township, Westmoreland County, Peoples Natural Gas Co. 4-3814 Camilla Giffin is drilling at 8,271 ft., and in Unity Township, its 1-3830 William Piper is drilling at 7,132 ft.

New locations reported in Pennsylvania were two: one each in Rayburn and Wayne townships, Armstrong County.

EASTERN TEXAS

East Texas' Deepest Well Completed for Distillate

DALLAS.—East Texas' deepest well, and second deepest for the state, prepared to complete as a gas-distillate discoverey in the Travis Peak. This week Humble Oil & Refining Co. 1 McWatters, Lamb Survey, south of Freestone in Freestone County, prepared to take potential from perforations at 8,315-8,400 ft. Previously it flowed some 1,600,000 cu. ft. of gas daily, plus 36 bbl. of distillate, through ¼-in. choke. The well was drilled to 16,347 ft. to test the Smackover lime.

Humble 1 Sherlock, Oliver Anderson Survey, east offset to the discovery well of South Tyler Paluxy field, Smith County, cored to 7,773 ft. in shale, with no shows. The well indicated commercial production in the Paluxy on a drill-stem test from 7,619-69 ft. With the tool open 2 hours and 25 minutes, and using a 1,700-ft. water blanket, recovery was 4,800 ft. of oil, cut with gas and water cushion, plus 45 ft. of oil and gas-cut mud. It also flowed an unestimated amount of oil. Gravity of the oil was 21.2°. The same operators' 1 Thurman Crawford, about 2 miles west of Linn in Nacogdoches County, was drilling lime and shale at 6,875 ft.

Magnolia Petroleum Co. 1 Pierce, Lindsay Mann Survey, 1-mile southeast stepout to the Rodessa gas-distillate discovery of the Lindale area, northern Smith County, had no shows in coring the Rodessa from 9,848-76 ft. Hole was to be reamed for additional coring.

In Bowie County, Gulf Oil Corp. 1 John Veach started coring at 8,096 ft. and was below 8,124 ft. in sand and shale. Placid Oil Co. 1 Katherine Bosch, Whelan field deep test, was drilling sand and shale at 9,335 ft. Three miles northwest of Mexia, Limestone County, Frazier & Reiter 1 Steubenrauch was drilling at 7,634 ft. in sandy lime and shale.

EAST TEXAS (DISTRICTS 5 & 6) WILDCAT FAILURE

Limestone County: A. F. Tinney 1 A. R. Reed, 100-acre tract, P. Varela Sur., 10 mi. SW Mexia, dry, TD 5,632 ft. in Travis Peak, sample tops: Austin 2,651-3,000 ft., Massive anhydrite 4,680 ft.

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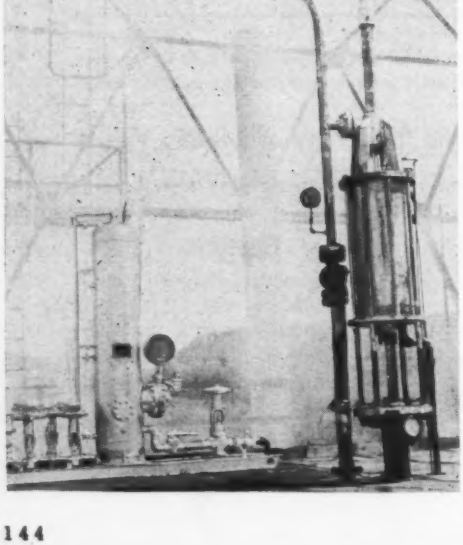

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N. CENTRAL TEXAS

New Jack County Wells Will Be Put on Pump

WICHITA FALLS. — Mid - Continent Petroleum Corp. 1 Killen, B. Lewis Survey, 3 miles southwest of Post Oak in northern Jack County, planned to install pumping equipment after swabbing recovered 63½ bbl. of oil in 8 hours. Prior to that gage, it had been shut in for 12 hours. Perforations were in the Strawn sand at 3,792-95 ft.

In southeastern Jack County, Russell Maguire 1 Cherryhomes, D. Crenshaw Survey, extended conglomerate production ½ mile northeast of Worsham field, when it completed on the pump for 109½ bbl. of oil a day. Top of the Bend conglomerate was 4,724 ft.

New Mississippian oil was in prospect at Warren Oil Corp. 1 Tilghman, 3 miles southwest of Jacksboro, in Block 4, Navarro CSL. The wildcat topped the formation at 5,391 ft. and drilled to 5,403 ft. where a 2-hour drill-stem test recovered ½ bbl. of oil and ½ bbl. of oil-cut mud. Bottom-hole pressure was 2,500 psi. Operators ran electrical surveys to 5,408 ft., total depth, and prepared to set casing.

Two new explorations were announced for Jack County. In the eastern section, Wright, Clark & Senkel 1 Hart-Lewis, approximately 2,850 ft. from south and 5,700 ft. from west lines, H. Martin Survey, will attempt to extend the West Chico conglomerate trend across the line from Wise County. Location is 6 miles southeast of the town of Cundiff and about 1½ miles southwest of R. B. Thrift 1 Blocker, W. A. Goman Survey, which has indicated a Bend discovery or extension. The other test is Panhandle Producing & Refining Co. 1-C Cherryhomes, a 5,500-ft. wildcat 4½ miles southeast of Jacksboro and about 2 miles northwest of Cherryhomes Bend conglomerate field. Drill site is 3,088 ft. from south and 3,458 ft. from east lines of the J. Henson Survey.

In Wise County, R. B. Thrift 1 Blocker reported a flow of 18 bbl. of oil the first hour and 11 bbl. the second hour of a 2-hour drill-stem test on perforations at 5,494-5,552 ft. It is 2 miles southwest of the Chico field limits. One location west, Standard-Fryer Drilling Co. 1 Simmons was drilling below 3,375 ft. in shale. Cities Service Oil Co. 1 McKissick was drilling below 7,856 ft. Details on a drill-stem test of the Ellenburger at 7,735-46 ft. were not reported.

In Southwestern Clay County, Fain & McGaha 1 Fulgham, Block 59, J. H. Belcher Survey, drilled sand showing oil from 4,487-92 ft. A drill-stem test of that interval had gas at the top in 22 minutes and recovered 300 ft. of oil plus 60 ft. of oil-cut mud. The well is ¾ mile southwest of Amos & Andy Strawn sand field, but is reported to be in another pay.

In Throckmorton County Cities Service and Sinclair Prairie 1 SMS Ranch, Block 100, BBB&C Survey, 12 miles northwest of Throckmorton, squeezed perforations from 5,170-72 ft., which showed salt water.

In Montague County, 1 mile west of Lewis - Stuart Caddo conglomerate field, Russell Maguire 1 Vanbebber, S. Davidson Survey, ran a 1-hour drill-stem test from 6,256-6,307 ft., in the conglomerate, which recovered 75 ft. of heavily oil-cut mud. Bottom-hole pressure was 1,200 psi. in 20 minutes. Operators continued drilling below 6,330 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCATS

Archer County: Tom B. Medders 1 Mrs. O. M. Fuller "C," 12-1-H&TC, 7½ mi. S. Wichita Falls, flowed 121 bbl. 42°-gravity oil in 6 hr., ¼-in. choke, Vogtsberger sand 4,746-77 ft. TD, CP 410-380 psi.

Cooke County: E. L. Lesslie 1 R. M. Lawson, H. Nail Sur., A-790, 1 mi. SE Hood, pumped 72 bbl. 40°-gravity oil a day, sand 1,330-38 ft., TD 1,343 ft.

Haskell County :Danciger Oil & Refining Co. 1 C. L. Bogard, 239-45-H&TC, 4½ mi. W Rochester, pumped 180 bbl. 39°-gravity oil, plus 2,000 ft. salt water, Strawn sand 5,023-27 ft., TD 5,119 ft.

Jack County: Russell Maguire 1 T. H. Cherryhomes, D. Crenshaw Sur., 7 mi. SE Jacksboro, pumped 109½ bbl. 41°-gravity oil a day, conglomerate 4,747-52 ft., TD 5,206 ft.

Jones County: Roark, Hooker & Roark 1 Alec Carter, 53-18-T&P, 1½ mi. N. Noodle, pumped 185 bbl. 40°-gravity oil a day, Hope lime 2,772-76 ft., TD 3,040 ft.

Throckmorton County, 1½-mile NW extension to Sztykgold field: Fred M. Manning, Inc., 1 Goodstein-Brown "L," Sec. 215, BBB&C Sur., 6 mi. NW Throckmorton, pumped 70 bbl. 40°-gravity oil a day, GOR 425 cu. ft., Caddo 4,550-60 ft., TD 5,143 ft.

Eastland County: Lone Star Producing Co. 1-C C. J. Kleiner, Sec. 71, Blk. 4, H&TC Sur., 9 mi. NE Cisco, flowed 292 bbl. 42°-gravity oil a day, ¾-in. choke, from perforations 3,527-40 ft., CP 430 psi., TP 140 psi., GOR 500 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES

Archer County: The Texas Co. 1 C. R. Miller, Lot 11, Mangold Subd., 1½ mi. NW Mankins, dry, TD 5,086 ft., no shows.

Brown County: J. E. Fitzpatrick 1 H. D. Kilgore, Lot 44, Kerr CSL, 1 mi. SW Brownwood, dry, TD 600 ft.

G. C. & M. R. Grace 3 J. H. Morgan, Sec. 31, BBB&C Sur., 5 mi. SE Rising Star, dry, TD 841 ft.

Clay County: L. A. Hedrick 1 Guy Harding, M. Lassiter Sur., 2½ mi. NE Byers, dry, TD 2,105 ft.

Comanche County: France and Gillespie 1 McMullen, Sec. 33, D&DA Lands, 3½ mi. SW Gorman, dry, TD 2,764 ft., Marble Falls 2,798 ft.

Eastland County: Huntley and Gilliam 1

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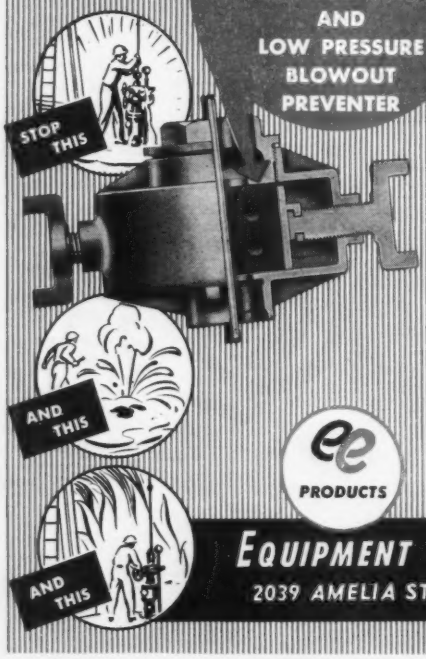

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N. D. Gallagher, Sec. 77, H&TC Sur., 1 mi. E Cisco, dry, TD 4,107 ft., Caddo 3,140 ft., Marble Falls 3,450 ft., Mississippi 3,932 ft.

Jones County: Neeld & Hood Drilling Co. 1 M. J. Cook, S. M. Hale Sur., 2 mi. SW Hawley, dry, TD 3,066 ft., Dotham 1,825 ft., Noodle 1,910 ft., coal 2,157 ft., Flippen sand 2,175 ft., lime 2,200 ft., Gunsight 2,400 ft., King sand 2,430 ft., Swastika 2,523 ft., Reef 3,030 ft., elev. 1,707 ft.

Roark, Hooker & Roark 1 D. O. Huddleston, 48-18-T&P, 1½ mi. N Noodle, dry, TD 2,833 ft.

Roark, Hooker & Roark 1 Johnnie Sears, Blk. 10, League 150, DeWitt CSL, 2 mi. SE Noodle, dry, TD 3,506 ft.

West Central Drilling Co. 1 B. A. Stephenson, Blk. 5, J. Winters Sur., 1 mi. SW Hodges, dry, TD 2,608 ft.

Jack County: Wilcox Oil Co. 1 R. L. Voyles "G" BBB&C Sur., 2 mi. S Antelope, dry, TD 5,294 ft., Caddo 4,737 ft.

Mills County: Beard, Tullons, Beaty & Odom 1 J. B. Pfluger, J. W. Hiller Sur., 12 mi. NE Goldthwaite, dry, TD 4,578 ft., Marble Falls 3,658 ft., had show of gas at 4,425-4,577 and 4,008-18 ft., elev. 1,640 ft.

Shackelford County: G. E. Kadane & Sons 1 J. F. Sedwick, TE&L Sur., 8 mi. NE Albany, dry, TD 4,531 ft., Ellenburger 4,405 ft.

Roeser & Pendleton, Inc., 15-A-113 Cook, Sec. 113, ETRR Sur., 8 mi. NW Albany, dry, TD 5,170 ft., conglomerate 4,858 ft., Chester 4,990 ft., Chappell 5,035 ft., Ellenburger 5,162 ft., elev. 1,835 ft.

E. H. R. Sabens 1 W. H. Green "D," Sec. 71, T&P Sur., 15 mi. SW Albany, dry, TD 4,642 ft., Caddo 3,995 ft., Ellenburger 4,574 ft.

Warren Wright 1 Clausell & Long, Sec. 576, TE&L Sur., 4 mi. NE Albany, dry, TD 4,762 ft., Caddo 4,089 ft., Mississippi 4,677 ft., Ellenburger 4,740 ft.

Wise County: Oil Well Drilling Co. 1 J. J. Patton, H. M. Cassidy Sur., 5 mi. NW Alvord, dry, TD 6,177 ft., Caddo 5,546 ft.

Young County: L. T. & Bobby Burns 1 J. A. King, Sec. 313, TE&L Sur., 2½ mi. E Padgett, dry, TD 5,022 ft.

LA.-ARK.

Claiborne Wildcat Coring After Drill-Stem Test

SHREVEPORT.—H. W. Klein 1 A. H. Sims, Claborne Parish wildcat in 34-20n-5w, was coring and testing its way through the Cotton Valley formation. A core from 9,221-28 ft. yielded a full recovery of sand with distillate odor. A drill-stem test of the section failed due to mechanical difficulties, but recovered some gas and distillate-cut mud. Bottom-hole flowing pressure was 2,075 psi.

It was then cored down to 9,236 ft., recovering 8 ft. of hard, tight sand with no shows, and a 25-minute drill-stem test from 9,221-36 ft. recovered the 1,400-ft. water blanket plus 540 ft. of salt water. The bottom 5-ft. of the next core, to 9,351 ft., was hard, tight shaly sand with slight gas odor. On last report it was coring ahead below 9,257 ft.

In DeSoto Parish, Potter Oils, Inc., 2 T. T. Tolson, 1-13n-16w, perforated at 5,342-54, 5,360-78 and 5,400-28 ft., then acidized with 10,000 gal. When opened, the well flowed gas, acid water and a slight show of oil, with an estimated 1,000,000 cu. ft. of gas daily. Testing continued.

Barnsdall Oil Co. 1 Ardis & Co., 27-22n-11w, Bossier Parish, was drilling in Travis Peak at 7,799 ft. D. E. M. Oil Co. 1 N. W. Sentell, 30-22n-13w, new 3,000-ft. Paluxy operation, was shut down for repairs at 2,816 ft. S. M. Aronson 1 Sentell, 23-19n-14w, Caddo Parish, was drilling below 5,102 ft. in the lower Glen Rose. Phillips Petroleum Co. 1 Ellerbe, 17-15n-12w, was delayed with a fish job for core barrel and drill cores at 8,714 ft.

In Sabine Parish, Guy Mabee Drilling Co.

Torrington Spherical Roller Bearings

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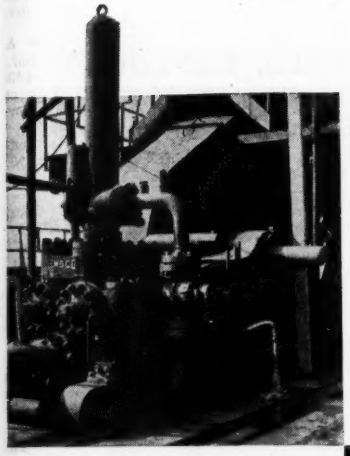
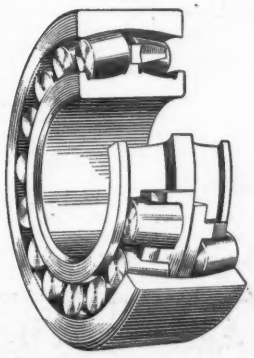
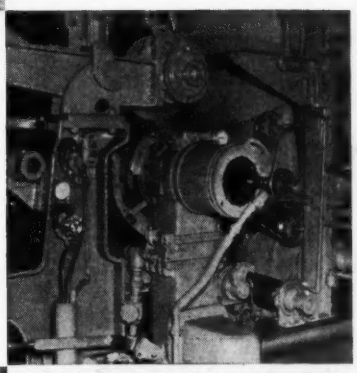


Emsco mounts slush pump main shaft on Torrington Spherical Roller Bearings for dependable day-in, day-out performance on the heaviest drilling schedules.





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1 Long Bell-Whitney Corp., 15-8n-14w, had total depth at 3,181 ft. in the Washita-Fredericksburg. A drill-stem test was planned after coring 3 ft. of hard lime having good oil odor and light stain at 3,161-81 ft. Projected depth was 3,500 ft.

Continental Oil Co. 1 Mansfield, 34-13n-4w, Winn Parish, was below 9,234 ft. in hard limestone.

In Union County, Arkansas, Macmillan Petroleum Corp. 1 C. Nash, SE NW 35-18s-15w, 2 miles east of El Dorado field, was drilling below 3,807 ft. in the Travis Peak, topped at 3,710 ft. Cores from 2,540-48 ft. recovered 8 ft. of sandy shale with slight gas odor. Projected depth is 8,000 ft. to test the Smackover.

ARKANSAS WILDCAT FAILURES

Columbia County: J. A. Funston 1 C. E. Franks, NW NW SE 25-19s-22w, dry, TD 2,885 ft.

Ouachita County: Carter Oil Co. 1 Betty Nix, NE NE NE 30-11s-19w, dry, TD 2,486 ft., stratigraphic test.

Union County: C. M. Bagley 2 Union, NW NW SE 36-19s-13w, dry, TD 2,423 ft., Midway 1,550 ft., Arkadelphia 2,115 ft., Nacatoch 2,220 ft., sand 2,318 ft., Saratoga 2,402 ft.

KANSAS

Barton County Gets New Pool

SOUTHEAST WORKMAN pool in southern Barton County was opened with the completion of E. H. Adair 1 Lanterman, NW NW SE 34-20s-12w. The well has a potential of 189 bbl. from the Arbuckle topped at 3,390 ft. Casing was set at 3,392 ft. and hole drilled to a total depth of 3,415 ft. In the same pool, Vickers Petroleum Co. has completed 1 Zirnisch, SE SE NW of Section 34 with a potential of 291 bbl. from the Arbuckle. Champlin Refining Co. is drilling plug at 1 Foelgner, a west offset to the discovery well and Keys Drilling Co. is drilling at 1 Langrehr, a north offset to the opener.

In southern Stafford County, Atlantic Refining Co. is giving McCandless pool an extension to the east. The well, Atlantic 3 McCandless, NE SE SE 30-15s-13w, had good shows in the Lansing-Kansas City and in the Simpson but is drilling ahead to the Arbuckle. A 20-minute test of the Lansing-Kansas City at 3,834-40 ft. had gas in 6 minutes and recovered 300 ft. of oil and 100 ft. of gas-cut mud. Operator cored saturated sand from the Simpson at 4,249-58 ft. The 1 McCandless made 347 bbl. per day from the Simpson.

Black Cloud pool near the northern edge of Stafford County has been opened in an area so close to Southeast Workman that they may combine into one pool. Black Cloud pool was opened with the completion of Adair 1 Wolf, NE NE NW 2-21s-12w, making 169 bbl. per day from the Arbuckle. Adair has set casing at 2 Lanterman, a north offset to the 1 Wolf and three diagonal locations southeast of the discovery well of Southeast Workman pool.

Hanlon & Boyle 2 Schartz, SE SW SW 7-20s-12w, ¼ mile west of the operator's recent extension to the Sunny Valley pool in Barton County, has been completed as a maximum well from the Lansing-Kansas City.

Barton County has another maximum well at Gulf Oil Corp. 8 Zahorsky, CSL NE SE 14-20s-11w in Silica pool. The well produces from the Arbuckle.

KANSAS WILDCAT FAILURES

Graham County: Cities Service Oil Co. 1 Gustafson, SW SW SW 36-9s-22w, dry, TD 4,035 ft., Topeka 3,345 ft., Lansing 3,561 ft., basal Kansas City 3,387 ft., conglomerate 3,947 ft., Simpson 3,997 ft., Arbuckle 4,004 ft.

Greenwood County: Armstrong & Souder 1 Hinds, SE SW SE 9-22s-11e, dry, TD 1,861 ft., no tops reported.

Harvey County: Shawver-Graham 1 Pierce, SW SW SE 21-23s-1w, dry, TD 3,693 ft., Heebner 2,110 ft., Lansing 2,360 ft., conglomerate 3,040 ft., Mississippian 3,642 ft., Kinderhook 3,372 ft., Misener 3,433 ft., Hunton 3,436 ft., Sylvan 3,500 ft., Viola 3,540 ft., Simpson 3,579 ft., Arbuckle 3,655 ft.

Marion County: Shaft et al 1 Liptau, SE SW SW 1-22s-3e, dry, TD 2,566 ft., Lansing 1,911 ft., Mississippian 2,466 ft., Kinderhook 2,552 ft.

Rice County: R. J. Stormfeltz et al 1 Feldman, NE NE NE 29-12s-8w, dry, TD 3,526 ft., Topeka 2,458 ft., Lansing 2,928 ft., Viola 3,387 ft., Simpson 3,435 ft., Arbuckle 3,486 ft.

Rooks County: Heathman & Honaker Drilling Co. 1 Ondersak, SW SW SW 5-8s-19w, dry, TD 3,592 ft., Heebner 3,250 ft., Lansing 3,291 ft., conglomerate 3,338 ft., Arbuckle 3,554 ft.

OHIO, KENTUCKY

Salt Creek Township Gets Good Oil Well

COLUMBUS.—W. E. Shrider 1 Shilling-Stemm, Section 9, Salt Creek Township, Muskingum County, should make one of the better wells in the north part of the field. The Medina sand at 4,147-56 ft. flowed an estimated 15 bbl. natural. The well apparently bridged after shot and flowed 30 bbl. when it broke through. The operator has moved ¼ mile east for the offset location.

M. B. Belden Co. 1 Mike Sabo, Section 14, Bethlehem Township, Stark County, extended the new gas pool ½ mile to the east. White Clinton at 4,440-60 ft. gaged 600,000 cu. ft. of gas natural, and 1,056,000 cu. ft. when shut in after shot. The same company has two additional wells drilling in the pool on 160-acre spacing.

A semiwildcat on F. E. Greer in Section 16, Jefferson Township, Knox County, was brought in as a small gas well by the Ohio Fuel Co. Upper Clinton at 2,826-39 ft. and the lower sand at 2,863-93 ft. together made 95,000 cu. ft. of gas natural, and 160,000 cu. ft. after shot.

The East Ohio Gas Co. is rigging up for a wildcat test on G. R. Aston in Section 26, Rose Township, Carroll County. Lydic and Shafer have a rig built on Lewis Pipes, Section 13, Richland Township, Holmes County, for a wildcat test.

EASTERN KENTUCKY

ASHLAND.—In Carter County, 2 miles west and slightly north of the county seat of Grayson, and located in 24-W-79, Van Everman of Huntington W. Va., is drilling at 1,285 ft. on the 1 Crawford and looking for the top of the Corniferous lime. This test offsets an old well that is reported to have had shows of oil and gas.

In Johnson County, 3-Q-80, Williams Branch of Mudlick Creek, Crate Rice et al of Paintsville, Ky., topped the objective Big Six sand at 2,175 ft. with no showing and was drilling ahead at 2,185 ft. The test is located on O. P. Williams tract.

In southern Fleming County, Ed Lillie et al of Cincinnati, Ohio, are running casing at the 2 John Riley, 14-V-71. Total depth is 2,132 ft. in Knox dolomite topped at 1,590 ft. Operators will test a show of oil found at 2,120-32 ft.

EASTERN KENTUCKY WILDCAT FAILURE

Morgan County: Endicott 1 August Jenkins, Jones Creek of Licking River, dry, TD 1,850 ft.

WESTERN KENTUCKY

OWENSBORO.—Carter Oil Co. has completed 1 Culver heirs, 24-P-21, Hitesville area in the northeastern part of Union

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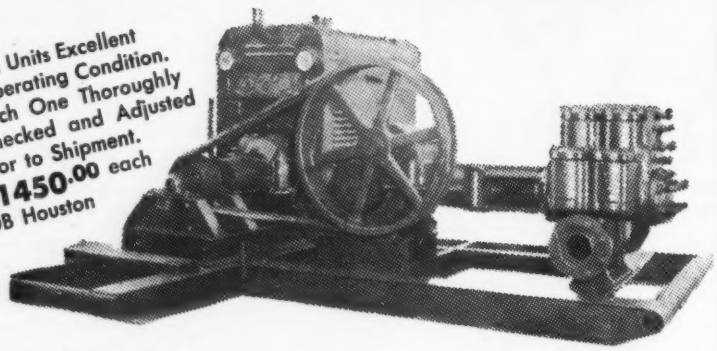

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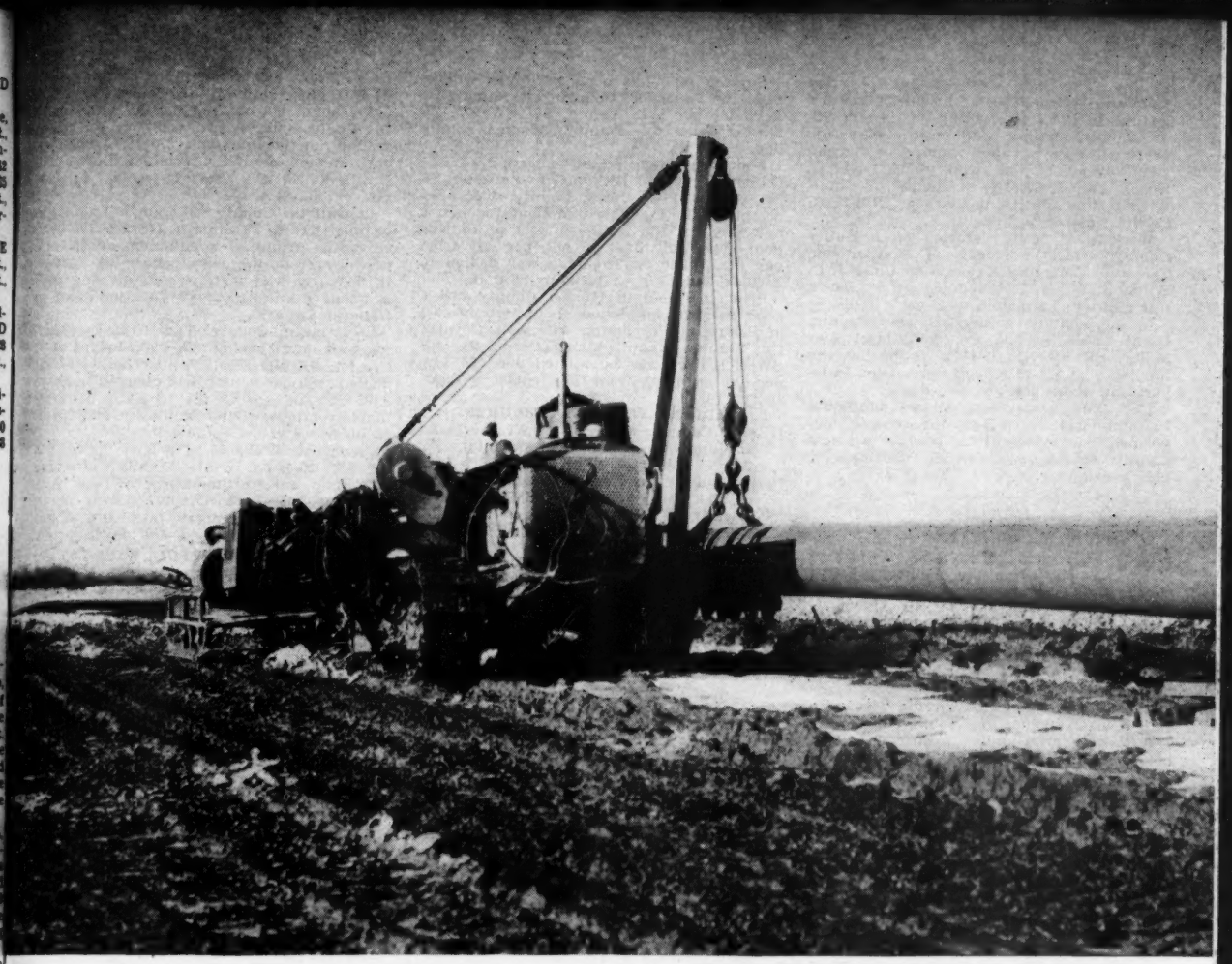

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County. The well made 45 bbl. per day from the Waltersburg at 1,695-1,702 ft.

Gulf Oil Corp. is cleaning out after a 15-qt. shot in another well on the east side of North Euterpe pool which was opened last November. The well, Gulf 1 H. C. Keach, SW SE SW 5-O-26, Henderson County, is testing the Hardinsburg at 1,710-20 ft. Casing was set at 1,710 ft.

Work was recently started on a Butler County wildcat northeast of Morgantown. The well, Columbus Exploration Co. 1 J. C. Williams, 6-J-37, is scheduled as a 2,500-ft. test and will be drilled with cable tools.

In the Pellville area of Daviess County, Great Lakes Carbon Co. 8-M Hazel Aud Miller, SE SE NE 21-P-32, is testing the McClosky at 965-75 ft. and is reported to be pumping about 150 bbl. per day.

J. C. Ellis has completed two additional Palestine wells in 7-P-28, the recently developed part of Griffiths pool in Daviess County. Production for each well was 20 bbl. per day.

INDIANA

EVANSVILLE.—Superior Oil Co. has completed the second oil well in Kolb pool which was opened in the northern part of Gibson County in February. The new well, Superior 1 Theresa Kolb, SE SW SW 22-1s-10w, was completed for 210 bbl. per day from the McClosky at 1,876-80 ft. and 1,895-1,900 ft. This well is the southwest diagonal offset to the discovery well which made 26 bbl. from the McClosky. The same operator is drilling plug to test the McClosky at 2 J. Kolb, 2 locations south of the discovery well, after coring saturated pay at 1,857-61 ft.

The Posey County wildcat, Mitchell & Heppard 1 E. Thomas, NW NE SE 24-7s-13w, is pump testing the Cypress after swabbing at the rate of 85 bbl. of oil and 30 bbl. of water per day. The well is about 1 mile southeast of LaMott pool and a little more than 1 mile north of the river. Production is from perforations at 2,359-67 ft.

Surface pipe has been set for a wildcat test in Fountain County at Ratcliff & Beckelhymer 1 D. Young, SW SW SW 23-21n-8w, near the Fountain-Warren county line.

Following a long period of testing, George C. Schoonmaker 1 Bishop Grimmelsman, SE SE SE 9-8s-14w, Posey County, has been completed in the Palestine sand to open a new pay for the northern part of College pool. The well made 35 bbl. per day from pay at 1,730-40 ft. The hole was drilled to 2,769 ft. but plugged back to 1,740 ft.

Princeton pool in Gibson County has a good Benoist completion about ½ mile east of Princeton city limits. The well, Coy Oil Co. 2 Bury Manufacturing Corp., NE NE SW 8-2s-10w, was completed for 288 bbl. per day on pump from the Benoist at 1,930-49 ft.

INDIANA WILDCAT FAILURES

Gibson County: George & Wrather and Phillips Petroleum Co. 1 Schmidt, SW SE NE 8-4s-11w, dry, TD 2,600 ft.

Posey County: Ashland Oil & Refining Co. et al 1 Dan Williams, SE SW SW 26-5s-13w, dry, TD 2,997 ft.

Calvert & Willis 1 C. Barrett, SE SE SW 35-5s-14w, dry, TD 3,136 ft.

Spencer County: Felmont Oil Corp. 1 H. D. Hagen, NW NW SW 19-6s-4w, dry, TD 1,285 ft.

ILLINOIS

Good Completions For North Maud Pool

MATTOON.—North Maud pool in Wabash County is still expanding after recent consolidation with Maud, West and Maud, Central. The pool had a good north extension early in the year and is also getting some good wells on the southeastern edge toward Maud pool. Within the past week, C. E. Skiles completed three Benoist wells in 20-1s-13w, with initial productions averaging about 140 bbl. per day. Cities Service Oil Co. completed two wells in the same section for 195 bbl. and 225 bbl. per day, and Calvert & Willis completed 2 Wirth Brothers, SE SW NW 21-1s-13w, for 150 bbl. per day.

In Gallatin County, George S. Engle has completed 1 R. V. Stinson, NE SE SW 9-9s-9e, with an initial production of 35 bbl. per day from the Hardinsburg at 2,119-35 ft. The pay was shot with 60 qt. The well is about 1 mile north of Junction pool in Gallatin County.

In Franklin County, Tom Gray is cleaning out and testing the McClosky at 1 Croslin, SE NE SE 17-7s-4e. The well was drilled to 3,209 ft. but was plugged back to 3,185 ft. and casing set to 3,170 ft. after the lower part of the McClosky at 3,201-08 ft. made water.

Calvert & Willis et al 2 Kirk heirs, S½ SE SW 29-4s-8e, White County, is going on pump for further tests of the Aux Vases at 3,385-3,414 ft. The well is about 3 miles east of Bungay pool and about midway between Enfield and Springerton.

ILLINOIS SUCCESSFUL WILDCAT

Gallatin County: George E. Engle 1 R. V. Stinson, NE SE SW 9-9s-9e, IP 35 bbl., Hardinsburg sand 2,219-35 ft., TD 2,139 ft.

ILLINOIS WILDCAT FAILURES

Clay County: Benson 1 McGraw, SE SE NW 16-2n-6e, dry, TD 3,181 ft.

Jasper County: Continental Oil Co. 1 G. Ochs, SE SW SW 13-6n-10e, dry, TD 2,945 ft.

Saline County: C. E. Brehm 1 C. E. Garner, NE SW SE 35-7s-7e, dry, TD 3,075 ft.

C. E. Brehm 1 O. Taylor, SE SE NW 8-9s-6e. dry, TD 2,380 ft.

White County: Wayne Drilling Co. 1 White County Trustee, NE NW NE 23-5s-9e, dry, TD 3,219 ft.

G. L. Reasor 1 E. Brown, NW SE SW 11-5s-10e, dry, TD 3,077 ft.

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Los Angeles, Room 423, 714 W. Olympic Blvd.

PERMIAN BASIN

Scurry County Gets Canyon Lime Discovery

MIDLAND.--Humble Oil & Refining Co. 1 Bishop, Canyon lime discovery in the SW SW 164-97-H&TC, 13 miles southwest of Snyder and about 3 miles south of the Diamond M field, Scurry County, was flowing to pits to clean out, at the rate of 19 bbl. of oil an hour. The flow was gaged through ⅜-in. choke. Operators swabbed the well in, without acid, after setting packer at 6,636 ft. Perforations are from 6,650-79 ft.

The Diamond M field gained its second producer at Lion Oil Co. 4 McLaughlin, a south offset location, in 182-97-H&TC. On a drill-stem test from 6,696-6,710 ft., in the Canyon, gas came to the top in 3 minutes, mud in 14 minutes and oil 1 minute later. It then flowed oil for 8 minutes at the rate of 40 bbl. of oil an hour. Total recovery was not reported. It was cored ahead to 6,720 ft., and electrical surveys made. The field's north offset, Lion 3 McLaughlin, set 7-in. casing at 6,623 ft., 1 ft. off bottom.

The fourth producer and ½-mile east extension to the Dermott Canyon lime field, Scurry County, was completed at Standard Oil Co. of Texas 2-2 Jessie W. Brown, 440-97-H&TC. Initial potential was 752 bbl. of oil in 24 hours, through 22/64-in. choke. Gas-oil ratio was 806 cu. ft.

Six miles east of the town of Crane, in east-central Crane County, Humble 1 Jax Cowden, SE SE 58-X-CCSD&RGNG, was said to have developed water on a drill-stem test of the Ellenburger at 10,942-11,032 ft. Open 2 hours on the test, it had a strong blow of air for part of the period. It recovered the water blanket, followed by 300 ft. of slightly gas-cut mud and some 3,000 ft. of salty sulfur water. Operators ran electrical surveys to 11,032 ft., total depth. According to reports, it was to be plugged back to retest the upper section of the Ellenburger, from which some free oil had been recovered on drill-stem tests.

Magnolia Petroleum Co. 1-A TXL, northern Upton County discovery, flowed 266.44 bbl. of 52°-gravity oil, through ¼-in. choke, in 24 hours, from its first set of perforations to be tested at 12,780-820 ft. Gas-oil ratio was 1,487 ft., flowing tubing pressure ranged from 750-675 psi. In the 29 hours previous to the test, total oil swabbed and flowed from a 500-bbl. oil load, was 437 bbl. According to reports, the section at 12,700-30 ft. is to be perforated and tested next. Packer will be set between the new holes and the first perforations.

In southcentral Borden County, Seaboard Oil Co. of Delaware 1 T. J. Good, NE SW 37-33-T4N-TP, 6 miles northwest of the Dealmoor field, had a drilling break at 7,610 ft. It drilled ahead to 3,653 ft., where it showed some fluorescence in drill samples. A drill-stem test was to be run from 7,603-53 ft.

In Gaines County, Magnolia 1 W. C. Hicks, NW NW Tract 16, League 273, Loving CSL, was to be drilled ahead to 14,000 ft. if necessary, to explore the Ellenburger. It was originally projected to 13,000. At last report, it was drilling ahead below 13,084 ft. in unidentified sand and dolomite.

WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURE

Pecos County: H. O. Pool 1 Ruth Steves-State, NE NE SW 118-11-H&TC, 10 mi. SW Girvin, dry, TD 1,707 ft., San Andres 1,660 ft., elev. 2,475 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Amerada's 1-B-T-A State, NW NE 2-12s-33e, ran a 4-hour and 25-minute drill-stem test at 8,992-9,172 ft., apparently in the Pennsylvanian, which had gas at the top in 5 minutes, mud in 8 minutes and oil in 25 minutes. It flowed at the rate of 64 bbl. of fluid an hour for 4 hours, cutting 20-35 per cent water. Gravity of the oil was 46.3° and gas-oil ratio was around 2,400 cu. ft. On an elevation of 4,235 ft., it placed top of the Pennsylvanian at 8,635 ft. Location is 11 miles northeast of shallow production in Caprock field.

Magnolia Petroleum Co. 1 T. Betenbaugh, SW SW 12-9s-35e, northwest of Crossroads field, was drilling ahead below 6,120 ft. Tentative top on the Glorietta at 5,260 ft., elevation 4,130 ft., was said to be 400 ft. higher than Mid-Continent Petroleum Co. 1 Dessie Sawyer, 5 miles to the southeast.

Three miles southwest of the Crossroads discovery, Amerada Petroleum Corp. 1-C-A State, 9-10s-36e, reported the Pennsylvanian top at 9,315 ft., on elevation of 4,030 ft., which was said to be 256 ft. high to the Crossroads discovery. It was drilling ahead below 9,902 ft.

Phillips Petroleum Co. 1 Shipp, 20-18s-37e, was drilling ahead in dolomite at 10,470 ft. A drill-stem test at 10,354-416 ft., open 90 minutes, recovered the 1,980 ft. of water blanket, plus 5,346 ft. of sulfur water.

Stanolind 1 South Mattix Unit, SW NE 15-24s-37e, ran a 60-minute drill-stem test in the Devonian at 7,494-7,549 ft., recovering 150 ft. of slightly oil and gas-cut mud. A second 1-hour test from 7,680-7,724 ft. recovered 30 ft. of drilling mud with no shows.

SOUTHWEST TEXAS

Deep Test in Starr County Cut Back to Gas Pay

CORPUS CHRISTI.—The Texas Co. A-7 Virginia Cox de Guerra, deep test at Roma gas field, in southwestern Starr County, has been completed in a new shallow gas pay zone for the field after failure to produce from the deep zones. This well was drilled to a depth of 10,222 ft., and tested noncommercial through perforations at 8,542-70 ft. Completion was made through perforations at 1,104-15 ft., for initial production of 450,000 cu. ft. of gas per day through a ¼-in. choke, making dry gas with 290 psi. tubing pressure and 390 psi. casing pressure. This well is in Share 92, Porcion 68.

Coastal Refineries, Inc., 3 Yturria Land & Livestock Co., Cecil area wildcat, Hidalgo County, is being completed for gas-condensate production from the 5,900-ft. level. Perforations made at 5,940-50 ft., flowed dry gas through ¼-in. chokes, with 1,000 psi. working pressure and bottom-hole pressure of 2,850 psi. open and 3,405 psi. shut in. Additional perforations were made at 5,920-38 ft., and drill-stem test through ¼-in. chokes recovered 1,000 ft. of amber condensate in 20 hours, with 875 psi. pressure.

R. E. Fair and Jack Woodward 1 J. Luptak, deep test at North Government Wells field, in Duval County, on drill-stem test through perforations at 7,660-7,728 ft., using ¼-in. chokes, developed maximum of 900 psi. working pressure and flowed at the rate of 385,000 cu. ft. of gas per day, recovering 100 ft. of condensate and 340 ft. of condensate-cut mud. Additional perforations have been made in this section for completion. Total depth is 10,506 ft., with 5½-in. casing set to 10,115 ft. Drill-stem tests in the lower sands failed to develop commercial production and hole was plugged back for completion in the 7,700-ft. zone in the upper portion of the Wilcox series. This well is 2 miles north of Freer, in the southeast corner of J. Poitevent Survey 41, Abstract 437.

Anderson-Prichard Oil Corp. 1 G. E. Johnson, located 6 miles northwest of Elgin, in Travis County, has been completed as a good shallow oil producer. When at a depth of 991 ft., a drill-stem test recovered 400 ft. of 36°-gravity oil and 75 ft. of oily mud in 35 minutes through ⅜-in. chokes. A string of 5½-in. casing was set to 982 ft., on top of the pay. Well was drilled to a total depth of 1,109 ft., and the well started flowing. Operators have the well shut in for storage. This well is located in Pedro Rodriguez Survey, in extreme northeast corner of Travis County.

In Dimmit County, Continental Oil Co. 1 Ewell McKnight et al, wildcat discovery prospect approximately 3 miles southwest of Carrizo Springs, is rigging up to pump after acidizing with 1,000 gal. of acid in perforations at 2,555-69 ft. Operators previously had tested oil on the swab through perforations at 2,689-2,702 ft. Total depth is 3,333 ft. This well is in Mills M. Battles Survey 11½, A-22.

A new discovery prospect 5 miles south of Bigfoot, in Frio County, Miller Royalty Co. and C. C. Dauchy 1 Thompson flowed considerable oil before pumping, then when placed on the pump made oil, but stopped flowing and now pumping about 1 bbl. oil per hour. The well had swabbed from 60 to 70 bbl. oil per day from open hole at 3,282-98 ft. in the Navarro sand previous to rigging up the pump.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Hidalgo County: New gas-condensate pool, Edinburg—Magnolia Pet. Co. 1 Carlson Unit, Lot 7, Block 1, A. J. McCall Subd., Porc. 68, 2 mi. SW of Edinburg, TD 11,246 ft., top pay 7,580 ft., perf. 7,580-7,640 ft., IP: 15,000,000 cu. ft. gas per day on open flow, GOR 124,000, shut-in pressure 3,012 psi., gravity 53.5°.

New gas-condensate pays, Mercedes pool —V. E. Cook, Trustee, 1 J. C. Royalty Corp., Tr. 2345, Block 58, North Capisallo Subd., dual completion: Top pay 6,858 ft., TD 8,563 ft., perf. 6,858-75 ft., IP: 5,200,000 cu. ft. gas per day and 186 bbl. condensate per day through ¼-in. choke. Top pay 6,960 ft., perf. 6,960-80 ft., IP: 1,900,000 cu. ft. gas per day and 53 bbl. condensate per day through a ¼-in. choke, 2,419 psi. working pressure, grav. 53°.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Bastrop County: Puma Oil & Gas Co. 2

(Continued on page 161)

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands under sec. 17 of the Leasing Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. sec. 181), as amended. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., on or before 1 p.m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (b) and (c). The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the number of the parcel and the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of at least double the amount of rental, but in no case less than $1,000 nor more than $5,000, must be furnished by a successful bidder prior to the issuance of a lease. An acceptable $5,000 surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil, and 12½ per cent to 16⅔ per cent for gas, in accordance with Schedule B in the lease form. Annual rental will be at the rate of $1.00 per acre. The land is offered in one parcel described as the SW¼ sec. 30, and the W½SW¼ sec. 32, T. 10 N., R. 68 W., 6th P.M., Colorado, 231.43 acres, and is within the known geologic structure of the Wellington Field. Bids must be submitted on or before 1:00 P.M., March 23, 1949. Marion Clawson, Director.

STATISTICS and

WEEKLY WELL COMPLETIONS . . . . WEEK ENDED MARCH 5 1949

	Total of all wells					9 wks.		Wildcat completions and discoveries					Cumulative total, 1949				
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	26	13	0	*13	27,742	206	252	0	0	0	0	0	0	0	0	0	0
Pennsylvania	30	13	3	†14	49,138	313	474	0	0	0	0	0	0	0	0	1	1
West Virginia	8	1	0	7	17,344	88	130	0	0	0	0	0	0	0	1	2	3
Ohio	22	5	5	‡12	53,624	198	174	0	0	0	0	0	0	0	1	6	7
Indiana	12	2	0	10	25,133	156	166	0	0	0	4	4	1	0	0	35	36
Kentucky	10	4	3	3	20,798	125	104	0	0	0	1	1	2	0	0	8	10
Illinois	22	11	0	11	62,199	347	331	1	0	0	6	7	6	0	0	59	65
Michigan	23	11	1	11	51,681	165	113	2	0	0	6	8	5	0	1	60	66
Kansas	48	25	2	21	163,113	488	467	0	0	0	6	6	8	0	2	64	74
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oklahoma	62	41	4	17	283,291	569	622	1	0	2	6	9	25	5	4	85	119
Texas	232	129	17	86	999,698	2,077	1,705	8	1	3	43	55	67	6	15	355	443
North Central (Dist. 7-B & 9)	79	41	0	38	239,179	643	506	7	0	0	18	25	36	0	1	147	184
West (Dist. 7-C & 8)	34	32	0	2	179,780	436	447	0	0	0	1	1	6	0	0	27	33
Panhandle (Dist. 10)	25	17	5	3	77,631	218	86	0	0	0	0	0	0	0	0	0	0
Eastern (Dist. 5 & 6)	12	3	3	‡6	81,446	106	87	0	0	0	1	1	0	1	1	18	20
Gulf Coast (Dist. 2 & 3)	35	18	3	14	217,844	320	292	1	0	2	5	8	13	3	10	67	93
Southwest (Dist. 1 & 4)	47	18	6	23	203,818	354	287	0	1	1	18	20	12	2	3	96	113
Louisiana	22	18	1	3	102,006	350	278	1	0	0	0	1	3	1	0	27	31
Northern	14	11	1	2	39,685	191	176	0	0	0	0	0	0	0	0	14	14
Southern	8	7	0	1	62,321	159	102	1	0	0	0	1	3	1	0	13	17
Arkansas	9	5	0	4	33,899	40	58	0	0	0	3	3	1	0	0	13	14
Mississippi	6	4	0	2	46,182	60	68	0	0	0	2	2	1	0	1	14	16
Southeastern States	1	0	0	1	3,554	7	7	0	0	0	1	1	0	0	0	6	6
Montana	2	2	0	0	8,718	28	39	0	0	0	0	0	1	0	1	4	6
Wyoming	9	6	0	3	34,913	90	67	1	0	0	0	1	4	0	0	18	22
Colorado-Utah	2	0	0	2	8,681	24	50	0	0	0	2	2	1	0	0	7	8
New Mexico	7	6	1	0	24,277	96	96	0	0	0	0	0	2	0	0	9	11
California	56	43	0	13	202,968	470	452	0	0	0	13	13	8	0	1	86	95
Total United States	609	339	37	233	2,218,959	5,897	5,653	14	1	5	93	113	135	12	27	859	1,033
Total previous week	595	327	21	247	2,217,176	5,288	5,062	8	2	1	101	112	121	11	22	766	920
Total March 6, 1948	591	355	38	198	2,016,209			11	1	2	69	83	126	9	41	826	1,002

Service wells included: *13, †14, ‡2.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.12
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.29	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. (For detailed price changes in all fields see The Oil and Gas Journal, January 1, 1948, page 107.)

A.P.I. REFINERY REPORT, WEEK ENDED FEBRUARY 26

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	807	2,306	188	1,134	1,367	25,694	8,699	20,262	11,129
Appalachian:									
District 1	98	323	64	71	91	2,947	427	857	462
District 2	67	238	31	48	116	1,566	139	195	256
Ind, Ill., Ky.	856	3,054	398	962	1,029	28,120	3,142	8,044	4,753
Okla., Kans., Mo.	441	1,674	144	600	550	12,817	562	2,867	2,304
Inland Texas	236	1,038	115	141	392	5,117	409	545	907
Texas Gulf Coast	1,384	4,287	522	2,245	1,728	20,003	2,903	9,249	9,869
La. Gulf Coast	437	1,397	384	740	454	6,535	1,955	2,997	3,175
N. La. and Ark.	72	187	62	63	98	2,926	334	805	181
Rocky Mountain:									
New Mexico	10	34	..	7	22	76	40	32	33
Other Rocky Mtn.	131	384	24	211	202	3,467	104	1,055	637
California	873	2,699	65	1,208	2,176	15,114	675	10,838	46,238
Feb. 26, 1949	5,412	17,621	1,997	7,430	8,225	124,382	19,389	57,746	80,246
Feb. 19, 1949	5,322	16,984	2,189	7,000	8,117	122,533	20,066	58,574	80,591
Feb. 28, 1948	5,463	15,796	2,780	7,963	8,824	111,040	9,594	33,836	49,200

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 261,965,000 bbl. as of February 26—up 2,412,000 bbl. One year ago 226,860,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.	
East Texas†	$2.65
Kettleman Hills, California*	2.14
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.
Bradford, Pennsylvania	4.
Eastern Ill. and Western Ind.†	2.
Tomball, Texas Gulf Coast	2.

*37°-37.9°. †35° and above.

TRENDS

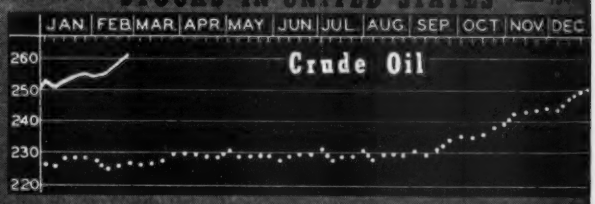
DAILY AVERAGE PRODUCTION FOR WEEK

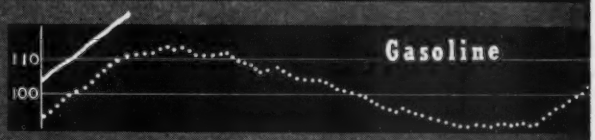
	Mar. 5 crude oil	B. of M. Feb. demand	Feb. 26 crude oil
Alabama	1,200	1,700	1,300
Arkansas	82,550	84,000	82,450
California	948,800	950,000	947,000
Colorado	*58,650	52,000	59,150
Eastern	62,800	62,300	62,100
Florida	1,125	1,300	1,150
Illinois	177,000	167,000	178,400
Indiana	23,200	21,000	22,700
Kansas	286,900	296,000	276,550
Kentucky	23,300	22,000	23,500
Louisiana	493,950	480,000	505,850
North Louisiana	117,950	.....	119,550
South Louisiana	376,000	.....	386,300
Michigan	46,850	45,000	46,450
Mississippi	102,700	126,000	103,500
Montana	24,250	24,000	24,300
Nebraska	300	700	300
New Mexico	135,300	127,000	134,900
Oklahoma	405,750	420,000	416,650
Texas	2,183,075	2,420,000	2,320,950
Dist. 1 (Southwest)	27,125	.....	27,990
Dist. 2 (Southwest)	144,125	.....	155,900
Dist. 4 (Southwest)	208,875	.....	220,025
Dist. 3 (Gulf Coast)	417,800	.....	442,360
Dist. 5 (Eastern)	42,800	.....	44,700
Dist. 6 (Eastern)	100,350	.....	107,425
East Texas field	285,625	.....	317,200
Dist. 7-C (West)	47,875	.....	49,950
Dist. 8 (West)	628,550	.....	660,150
Dist. 7-B (W. Central)	62,200	.....	65,925
Dist. 9 (N. Central)	129,850	.....	139,425
Dist. 10 (Panhandle)	87,900	.....	89,900
Wyoming	122,100	140,000	123,950
Total United States	†5,179,800	5,440,000	5,331,150
Change from prev. wk., dn.	151,350		

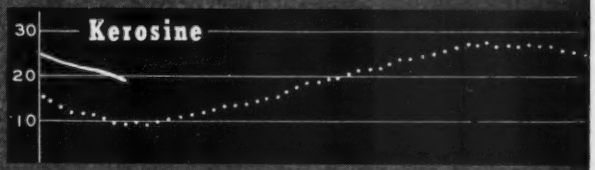
Total production January 1-March 5 ‡349,141,370 bbl.
Same period last year (crude plus cond.) 351,906,120 bbl.

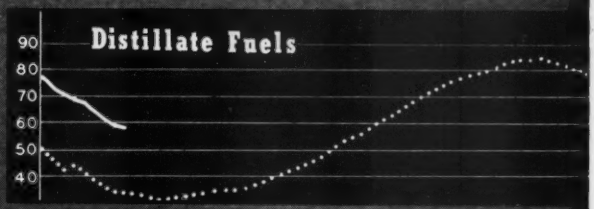
*Incl. 150 bbl. Utah production. †Not incl. 86,565 bbl. condensate. ‡Incl. 5,346,715 bbl. condensate.

STOCKS IN UNITED STATES

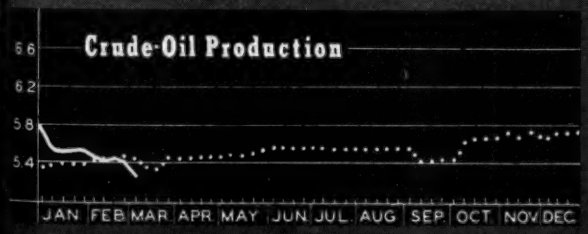


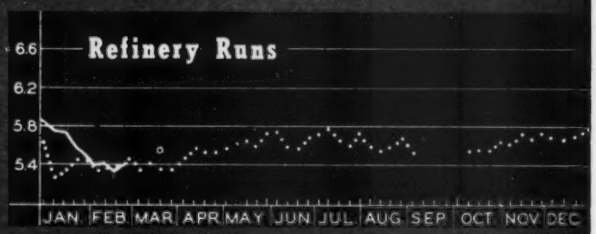




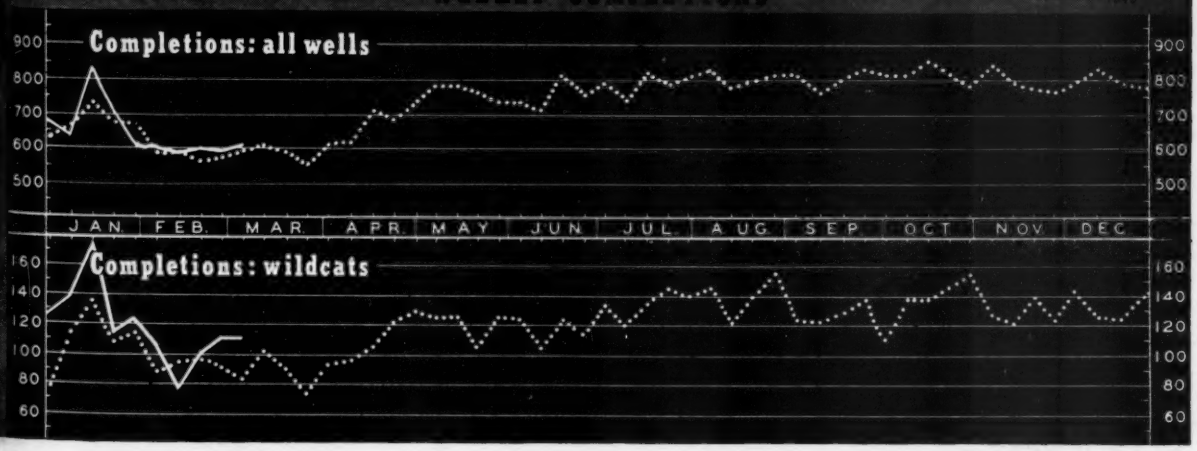


DAILY OPERATIONS





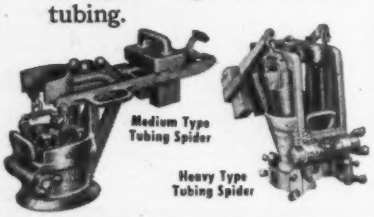
WEEKLY COMPLETIONS



SLIPS WON'T STICK

with Guiberson TUBING SPIDER

• One man can easily handle this compact, light-weight Type "B" Tubing Spider. You won't have to use a sledge hammer to dislodge the slips because their narrow backs fit the tapered bowl at any normal setting level. Slips have ample size—won't crush or damage tubing. Will fit rotary table or bolt to well head; has removable gate to place around tubing.



Type "B" is available with 5 slip sizes, 1" to 3". Other Guiberson Spiders are the automatic "Medium" and "Heavy" Types. For complete data see the Composite Catalog, Pages 1540-44.

REG. U. S. PAT. OFF.

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Guiberson U. S. A.

Established 1919

THE GUIBERSON CORPORATION

GENERAL OFFICES: DALLAS, TEXAS
EXPORT OFFICE: 30 Rockefeller Plaza, New York 20.
CALIFORNIA DISTRIBUTOR: W. R. Guiberson Co., 717 E. Gage Avenue, Los Angeles 1.
BRANCH OFFICES: Oklahoma City and Tulsa, Okla.; Alice, Houston, Kilgore, Longview, Odessa, and Wichita Falls, Tex.; Lafayette, La.; Wichita, Kan.; Newark, Ohio.

MARKETS

OPEN spot-market trading of petroleum products was dull in the Mid-Continent area and over the nation generally during the past week. Burning oils and residuals showed some further softening as mild temperatures prevailed throughout the country. Near the close of a winter which averaged some 10 per cent warmer than that of the preceding year, storage for the heating oils still remained full with little demand for the products. Further price cutting was noted in specific areas.

Some independent refiners, squeezed by the continued drop in products prices without a corresponding drop in the price of crude, were hoping for an over-all reduction in runs to stills as the only means of providing a firm market, even for gasoline, during the coming months.

While a strong gasoline demand was being anticipated, some observers were pessimistic over the coming market, pointing to inventories now considerably higher than at this time last year, and still increasing at a considerable rate.

There also was fear that surplus No. 2 would be cracked, providing a greater excess of gasoline and thereby tending to weaken the price structure for that product.

Movements of distress material, primarily by small independents, contributed to the softness in particular products during the past week.

In the Mid-Continent, No. 6 was reported moving in quantity last week at $1.00 a barrel. Natural gasoline, which dropped from 8½ cents on January 31 to 6 cents late in February, remained firm with no change in posted prices.

Gulf Coast Market Slow

Along the Gulf Coast products trading continued slow during the past week. Some distress material, No. 6 residual, was offered considerably under prevailing prices. However, the extreme lows reported were applicable chiefly to bunker fuel.

One observer expressed the belief that products prices had reached their lowest point and that any further change would be toward higher levels.

East Coast Prices Down

Continued weakening of the light burning-oil market on the East Coast was indicated last week in reports of new price concessions to buyers. One major supplier was reported to be offering discounts of 0.3 cent on No. 2 and 0.5 cent on kerosine in the barge trade in New York harbor.

A drop was noted in kerosine prices to 9½ cents, barges. Posted barge price of major suppliers remained at 10.2 cents, but some spot-market material was said to be moving even below 9½ cents. No. 2 posted price continued at 8½ cents, also with some sales under this figure taking place.

Cautious optimism regarding the outlook for No. 6 demand was expressed by some marketing officials last week. Recent drastic price cuts appeared to have steadied the market for this product, and new onshore demand may follow. Howard Page, executive assistant to the president of Standard Oil Co. (N.J.), last week in a talk in New York said the price of heavy fuel oil, which is now below parity with coal, probably would not rise much above the parity level.

Scattered price reductions at the tank-wagon and retail levels were reported at various New York state and New England points for diesel and No. 2. The weather continued unseasonally mild and depressed demand for the burning oils.

Representative Quotations

Representative spot-market quotations of leading suppliers as of March 7, 1949. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 73-75 octane	8½-9¼	10.9	9¼-10
Premium gasoline, 78-80 octane	9½-10¼	12	10¼-11
42-44 w.w kerosine	8-8½	9.25-10.2	8½-9
No. 2 straw fuel oil	7¼-7½	8.25- 8.5	7¾-8
No. 6 residual	$1.00-1.10	$1.85-2.00	$1.55-1.65

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6	5½	5¾
Grade 18-55	7.2	6.6	6.9

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	12-13.5
750 vis., No. 3-4 neutral	15-16.5
2,000 No. 5-6 neutral	17-18.5

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	24
200 vis., No. 3 neutral, 0-10 pp.	18

Western Pennsylvania

144-155 vis. 10 p.t. bright stock	24.5-37.5
180 vis. p.t. neutral	25.5-38.5

CRUDE-SCALE WAX
Mid-Continent

132-134 A.M.P.	5

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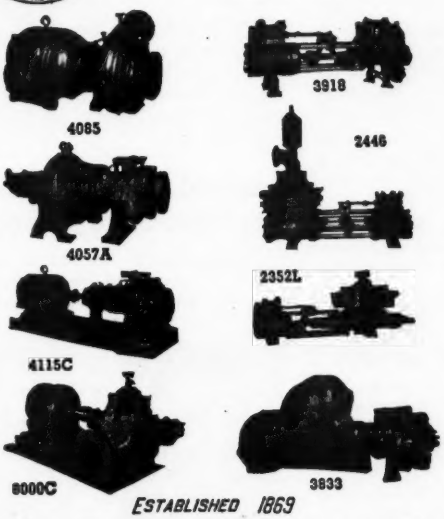
BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

323 W TENTH ST.

"I'll take the WHITE one every time!"

WYTEFACE "A"
Trade Mark
Steel Tapes for the Oil Industry

WYTEFACE "A" Steel Tapes have raised black graduations on a crack-proof white surface. Easy to read in any light, from any angle. Designed for hard service. Resist rust and corrosion. Raised rims and markings protect the white background from abrasion from rails, pipe, rocks, concrete. Made in styles especially for Oil Riggers, Oil Gaugers and for general measurements. See your supply house, or write for details to Keuffel & Esser Co., Hoboken, New Jersey.

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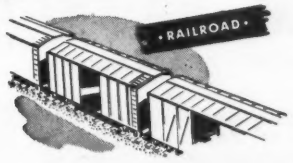
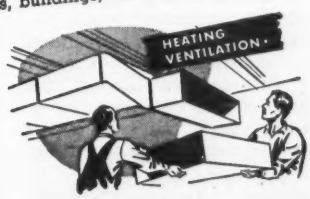
Galvanizing (Zinc coating) insures long-time, low-cost service . . . protects property . . . saves money. For as long as iron or steel is coated with Zinc, *it cannot rust!* For satisfaction, use galvanized materials . . : they're "Sealed-in-Zinc" against rust.

ZINC INSTITUTE 2 OZ. COATING SEAL OF QUALITY

TIME proves galvanized sheets stay stronger longer. Used as roofing and siding, they give buildings the "strength of steel" . . . the rust protection of Zinc. The "Seal of Quality" (above) is your guide to economy in buying galvanized sheets. It means they carry at least 2 oz. of Zinc per sq. ft. Galvanizing also lengthens fence life and service.



Galvanized products in railroad industry guard bridges, buildings, cars., etc., against rust.



Strength, workability and resistance to heat as well as rust, make galvanized sheets ideal for heating and air-conditioning.

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Fully illustrated and packed with practical information on galvanized sheets and Metallic Zinc Paint. Send for these *free* booklets, *today!*

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Address_____

Town_____ State_____

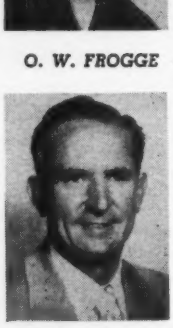
EQUIPMENT MEN ... in the News

Representatives Named by American Iron & Machine

W. McCHAREN

O. W. FROGGE

P. L. GILLIS



H. C. RISNER

Further additions and promotions of key personnel have taken place in the sales organization of American Iron & Machine Works. Walt McCharen has recently been added to the sales department and will make his headquarters at Hobbs, N. M.

O. W. Frogge has also been added to the sales department and will work as sales representative out of the Houston district. Another addition to the sales staff is P. L. Gillis, who will make his headquarters in Houma, La.

The company has also announced the appointment of Herbert C. Risner as sales representative for the State of California replacing W. F. Behrhorst who has been transferred to Odessa, Tex. Added to the Oklahoma City division sales department of the company, and covering the northern part of Oklahoma, is B. E. Sharp.

McCharen, previous to this appointment, has been with American Iron & Machine Works for 3 years as chief inspector at the Oklahoma City plant and in the engineering department. Frogge was formerly with Eastman Oilwell Survey Co. and Phillips Petroleum Co. Gillis had formerly served with Reed Roller Bit Co. and Halliburton Oil Well Cementing Co.

Risner is familiar with the California oil industry picture, having been connected with Sargent Engineering Corp. and Deep Well Sucker Rod & Pump Co. for 12 years in that area. Sharp had represented the company for several months in Illinois and prior to that, was in the engineering department in Oklahoma City.

$500,000 Plant Expansion Completed by Lebanon

Completion of a $500,000 plant expansion program has been announced by Lebanon Steel Foundry, Lebanon, Pa. Doubling the company's high-alloy steel casting facilities, the new plant addition and unique equipment installations are specially designed for the production of super-alloy castings under processes developed by Firth-Vickers Stainless Steels, Ltd., steel casting concern, of Sheffield, England.

The Centri-Die technique is said to be exceedingly versatile, and applicable as well to the production of alloyed materials not now commercially available—particularly in the direction of tubular or cylindrical structures which are difficult or impossible to forge or cast by any other method. Lebanon Steel Foundry is a supplier of stainless, special alloy and carbon-steel castings for use in the oil, chemical, and a variety of other exacting machinery and equipment requirements.

Lunkenheimer Announces Representative Changes

Lunkenheimer Co., manufacturer of bronze, iron and steel valves, announces changes in territorial representatives, as follows: Elmer R. Tieberman, Lunkenheimer representative, who for many years handled the oil field sales territory embracing Oklahoma and Kansas, with headquarters in Tulsa, has transferred to Dallas, covering Northeastern Texas, Northern Louisiana, and part of Arkansas.

E. R. TIEBERMAN

DUFFIE DAVIS

W. A. BOLES

JOSEPH WALDECK

Duffie (Dave) Davis, well known as a Lunkenheimer representative, succeeds Tieberman at Tulsa. Davis formerly worked out of Wichita Falls, covering West Texas. William A. Boles, Wichita Falls, recently joined the Lunkenheimer organization and will take over the territory formerly handled by Davis. Marshall Stickel and Joe Birkhead, long associated with Lunkenheimer as representatives in the Mid-Continent and Gulf Coast districts, will continue to maintain their headquarters at Houston.

Joseph Waldeck, widely known veteran Lunkenheimer representative, will confine his activities to parts of Missouri and Southeastern Illinois, with headquarters at St. Louis.

Web Wilson Oil Tools Occupies New Plant

Web Wilson Oil Tools, Inc., has recently moved into this new, modern plant in Los Angeles, which has increased the firm's covered floor space threefold. Architects are preparing plans for a new office building which is to be completed this year at the same site

Republic Occupies New Office and Warehouse

P. M. PIKE

Republic Supply Co. of California, jobbers and manufacturers of industrial and oil well supplies, announces the official opening of its new, modern $1,250,000 home office headquarters and main company warehouse in Los Angeles. Republic's new home features the latest in modern architecture. The warehouse is of one-story steel construction with aisles wide enough to allow the use of electric fork trucks and transporters.

In February 1910 P. M. Pike first went into the oil-equipment-supply business with his late brother, Thomas H. Pike, and George H. Tay, forming Tay Pike Co. Pike sold his interest in 1914. In March 1917 he purchased the Coalinga and Taft stores of Tay Pike Co. which went out of existence. In 1917, Republic Well Supply Co. was incorporated with the main office in San Francisco. W. Dale Russell was manager of the Coalinga store, and is now vice president of Republic and holds the longest record—32 years. In 1919 the name of the company was changed to Republic Supply Co. of California. Main offices were moved from San Francisco to Los Angeles in 1922. Pike served as president of the company from 1917 to 1928 and from that date on he has served as chairman of the board. In November 1943 John J. Pike, son of P. M. Pike, became president of Republic and the success of the company under his tenure speaks for itself.

J. J. PIKE

W. D. RUSSELL

Latest Addition to Lane-Wells Service Fleet

During 1948, 31 new hoist trucks and 7 skid units were added to the Lane-Wells service fleet. These units contain the latest technical equipment required for modern perforating, radioactivity well logging, and electrolog services

Cummins Will Introduce Powerful Diesel March 17

At a meeting planned for March 17 in Columbus, Ind., Cummins Engine Co. will introduce its 550-hp., 4-cycle, 12-cylinder, V-type, supercharged diesel, which turns at 2,100 r.p.m. The company claims this engine to be the most powerful high-speed diesel produced. It has already been field tested in off-highway haulage trucks with payloads of 30 to 40 tons, in a 5-yard shovel, and in a 65-ton locomotive.

In addition to unveiling of new products, the meeting will include a tour of the Cummins production and experimental departments.

FWD Appoints Rodney Kox

RODNEY KOX

Rodney Kox, formerly sales manager for Family Life Insurance Co., Chicago, has joined Four Wheel Drive Auto Co.'s sales staff as special field representative, according to Robert L. Koehler, FWD sales director. Kox will work with FWD salesmen and distributors throughout the United States.

Bower Made Chief Engineer Of Waukesha Motor Co.

LLOYD L. BOWER

Lloyd L. Bower has been appointed chief engineer of Waukesha Motor Co., succeeding James B. Fisher, who retired in January after 35 years of active duty.

Bower has been active in the company's engineering department for more than 20 years. He is a 1916 graduate of University of Michigan, school of engineering. Following World War 1, he became layout draftsman and transmission specialist for Garford Truck Co. In 1921 he became assistant to the chief engineer of Transport Truck Co., and later returned to Garford where he remained until his appointment as installation engineer for Waukesha in 1927.

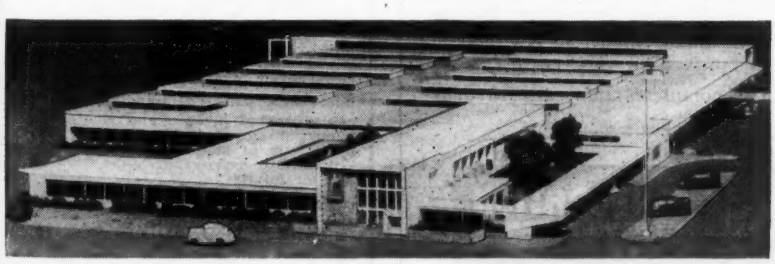
Air Reduction Research to Be Directed by Slottman

Dr. G. V. Slottman has been appointed director of research and engineering for Air Reduction Co., Inc. Slottman, who joined Air Reduction in 1934, has served as manager of the technical sales division and, in January 1949, was appointed technical assistant to the vice president in charge of sales, a position he held until his recent appointment.

He has been closely associated with Air Reduction's development and introduction of steel-making processes using large quantities of low-purity oxygen for both combustion purposes and as a chemical reagent.

Trident to Represent R-S

R.S. Products Corp., Philadelphia, has appointed Trident Engineering Co., San Francisco, as representative for its valve division.



New home office headquarters and main warehouse of Republic Supply Co. of California

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

1—SUPERIOR — Type FB — 6 x 7 Vertical Gas Engine Complete with Standard Equipment. Located in Houston. Will guarantee as good as new. Box C-783, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 100 H.P. LeRoi Motor cheap, also 35 Bessemer and 40 Weber. Light steel ladders, 12 foot. 409 Bewley Bg. 2-1620, Fort Worth.

REFINERY

For Sale Complete Treating and Super-Fractionating Plant. Located on Gulf Coast for economical handling of raw and refined products by rail, water or motor transport. Equipment in good condition. Box C-815, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

One Wilson Titan Rig, Complete.

PTAK PETROLEUM COMPANY
502 Hales Building
Oklahoma City, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: Mayhew 2000 Drill mounted on 1948, 2 Ton Chevrolet with Thornton Tandem. Split shaft power take off. Auxiliary Chevrolet Motor. 36 foot mast. 24 foot kelly. Uses 20′ drill pipe. 4½ by 6″ Gardner-Denver Pump. This rig new in April, 1948, is complete in all details. In perfect condition, ready to work. Price $19,000.00. Ben-Franklin Exploration, Inc., 303 Orpheum Building, Wichita 2, Kansas.

WELL drilling spudders, beams, light rotaries, core drills, tools, casing. Used equipment at money saving prices. Spang and Mills new tools. Leschen lines. Everything for well drilling. Pressey & Son, Pueblo, Colo.

1948 TD-9 International tractor with Superior sideboom. Used very little. Located in Chicago. $7500.00. W. H. Lyman Construction Co., 134 N. La Salle St., Chicago, Ill.

BULLDOZER: AC-HD7 Cable operated, angle and Bull blades. Top condition. Quick sale—$5,500.00. 19 Endicott St., Phillips, Texas; Phone 1388-W, Borger, Texas.

FOR SALE: Approx. 600′ of 7″ 22# used Seamless Casing, 1500′ of 2½″ 10thd Seamless used Tubing. Tennant Drilling Co., 210-211 Rivoli Theatre Bldg., Blackwell, Okla.

FOR SALE: Wilson Giant draw works, powered by 2—J.L.-1335 Buda engines and Wilson chain compound. Like new condition, with bargain price. Terms. Melton Supply Co., Seminole, Okla.

TWO CARDWELL RL Spudders. Good operating condition. Fully equipped with 59′ mast, light plants, lines and tools. Located Central Oklahoma. Prices and terms. Write: Barnes Drilling Co., 22 West Fourth St., Tulsa, Oklahoma.

FOR SALE: Model "K" Cardwell, single drum draw works powered by G.A.K. Waukesha engine. Equipped with 98′ "A" mast and sub skid. Priced for quick sale. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE

12—230 H.P. Type 10 Bessemer New 17″ Power Cylinders complete ready to run with 16″ to 18″ Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

COMPLETE 5000-7000′ CAPACITY ROTARY RIG

$45,000.00

EMSCO Draw works; two 12-cylinder Le Roi Engines, one *new*, one *factory overhauled;* new V-Belt Compound; 7¾″ x 18″ Pump; 300-ton B-J Hook; 26″ Gumbo Buster Rotary; Regan Crown Block; Emsco Swivel; Baash-Ross Traveling Block and Blowout Preventer; Butane Tank; Tool House and Tool Box; Vibrating Shale Shaker; 5 Kw. Kohler Light Plant; 6,200′ excellent 4½″ Drill Pipe with two Drill Collars. This rig is in splendid condition, and is *complete* and ready to drill. Located at Eunice, New Mexico.

LUCEY PRODUCTS CORPORATION
OIL WELL SUPPLIES
TULSA, OKLAHOMA

EQUIPMENT FOR SALE

STEEL

For All Purposes

Immediate Delivery

East and West Coast Warehouses

Write — Phone — Wire

LONG ISLAND BEAM CO.
39-21 21st St. Long Island City 1, N. Y.
Stillwell 6-5900-1-2

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

BOILERS For Sale: One 90 H.P., 125# W.P. Broderick—$750.00; one 100 H.P., 200# W.P. Lucey—$1,250.00. Both locomotive type oil field boilers. State certificates furnished. Recently overhauled. In good running shape. Worth the money. The Clay Brothers Drilling Company, Inc., 1804 Fair Building, Fort Worth, Texas.

2—M.C. 350 Bethlehem rotary drilling rigs complete with 127′ Lee C. Moore Cantilever (Jack-knife) derricks, less drill pipe and drill collars. For further information write Sharp Drilling Company, P.O. Box 1271 Midland, Texas.

SAVE WITH SAFETY—Very Good Used Wire Line—Any Size or Length up to 5,000′—Respooled for Your Inspection — Cable Tools For Sale. General Tool & Supply Co., P.O. Box 4387, Phone 61335, Oklahoma City, Okla.

50,000′ 6⅝″ 19.45# T&C Line Pipe. No. 1, Used. Located: Longview, Texas.

6,600′ 5½″ 15.5# J-55 Seamless. New. Located: Ellinwood, Kansas.

3—55,000 bbl. and 1—80,000 bbl. all-welded steel storage, for lease or sale. Located: Danciger Refinery, Longview, Texas.

W. C. BERRY
Tulsa, Oklahoma
Box 1858 Phone: 3-6141
Dallas, Texas
1509 Mercantile Bank Bldg.
Phone: Central 2950

USED STEEL PIPE AND TUBING

100,000 ft. of 1½″ O.D., 8 gauge
75,000 ft. of 2″ O.D., 10 gauge to 11 gauge
100,000 ft. of 2¼″ O.D., 10 to 11 gauge
50,000 ft. of 3½″ O.D., 9 gauge
40,000 ft. of 4″ O.D., 10 to 11 gauge
50,000 ft. of 5½″ O.D., 8 gauge

All the above is seamless, plain end, hydrostatically tested for 850 lbs. pressure.

16,000 ft. of 3″ standard line pipe, 8 thread
25,000 ft. of 6″ I.D. welded steel pipe, approx. ⅛″ wall, plain end
6,000 ft. of 7″ O.D. lapweld casing, 8 thread, 20 lbs.
3,400 ft. of 14″ O.D. Naylor spiral welded steel pipe, 14 gauge, 40′ lengths, grooved for Victaulic couplings

Reasonable prices. Immediate shipment

Also, bolted, welded and riveted steel tanks for storage and pressure.
600 tons of steel plates from ¼″ to ⅞″ coming from grain tanks, like new, free of holes.

Please send for our late lists.

A. GREENSPON PIPE CO., INC.
3615 Olive Street St. Louis (8), Mo.
Phones Nos. Franklin 0064 and 1606

EQUIPMENT FOR SALE

FOR SALE: 1—Model QSVSI Cardwell Allsteel Single Drum Oil Well Servicing Skid Type Winch, Serial No. QS-119, powered by Ford V-8 Engine Serial No. BB18-033910 located at Duncan, Oklahoma. Price $800. Cities Service Oil Co., Patridge, Bartlesville, Okla.

PIPELINE Construction Equipment for sale: Pipe cleaning machine with priming head, traveling or stationary, 6" to 12", excellent condition, $1,350. Two T40 International tractors with pipelayer attachments, good condition, very cheap. Contact C. W. Sternberg, 8250 Wier Drive, Houston, Texas Phone Preston 7043.

FOR SALE: 5CR6 Ideco Draw Works with 2 WAK Waukesha Motors compounded with V-Belt Compound; Model RL Cardwell Draw Works with 2 GAK Waukesha Motors; and 1—R6I Climax Motor. All in good condition. Sterling Drilling Company, Sterling, Kansas.

BUCYRUS-ERIE 24L Spudder, Trailer mounted; over 5,000 feet line; 2 strings of tools 4 inch to 10 inch; 2½ ton G.M.C. Tandem Dual Truck with detachable A-Frame and winch; 8-ft. x 10 ft. metal tool shed; Kohler Light Plant; 470 ft. new 10 inch wrought iron pipe; some used 6 and 8 inch pipe. All $10,000.00. Lealand West, The Scott County State Bank Building, Scottsburg, Indiana, Telephone 4931 or 4391.

DIESEL ENGINE

Priced for Immediate Sale

Cooper-Bessemer 6-cylinder stationary engine. Full diesel, 10½" bore, 13½" stroke, 325 hp. at 450 r.p.m. continuous duty, 515 r.p.m. emergency duty. Cooper-Bessemer fuel system, Bosch nozzles, replaceable liners.

Completely rebuilt by Cooper-Bessemer Corp. in 1944 and has not been operated since rebuilt at factory. Can be converted for Natural Gas operation.

Phone, Wire, Write

Houston Shell & Concrete Co.

Phone: Charter 4-9301 P. O. Box 1321
Houston, Texas

FOR SALE

STAINLESS STEEL DISTILLATION UNIT

One—36" I.D. x 32' x ¼" Shell stainless steel Fractionator with 7'-7" skirt—with 10 trays.

Four—5" x 3" x 6" Union Simplex Steam Pumps with solid stainless fluid ends.

One—Heater and Reboiler with 1" I.D. tubes and bolted return headers—stainless.

One—Condenser with ¾ I.D. tubes and bolted return headers—stainless.

Charge and product piping — stainless steel.

Analysis of stainless steel:
18% Chrome
8% Nickel
3% Molydenum
½ to 1% Columbium

Unit is in excellent condition
Complete drawings available
We invite your inspection

PROCESS CONSTRUCTION CO., INC.
20700 South Figueroa Street
Torrance, California

Los Angeles phones.
PLeasant 2-6366 PLeasant 1-6660

EQUIPMENT FOR SALE

FOR SALE: Franks Model D shot hole drill. Mounted on 1942 Ford. Rig and truck in A-1 condition. Must see to appreciate. $3,500 cash. Seismograph Drilling Supply, Britton, Oklahoma.

FOR SALE: Two Franks Model FA Shot Hole Drills. One mounted on 1947 2 Ton Chevrolet, one on 1947 2 Ton Ford. One Water tank 700 gallons capacity, mounted on 1947 2 Ton Chevrolet, one 575 gallons capacity, mounted on 1947 1½ Ton Ford. Complete with all necessary equipment. Each Drilling unit with water tank truck $8750.00 or all equipment $17,000.00. Now in use. Telephone 62-4267, Oklahoma City, or write Box C-812, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—Cardwell Draw Works, Model "L"—Air Clutches—A-1 Condition. Box 3246, Corpus Christi, Texas.

MANUFACTURERS LATEST DESIGN

Hydraulic Casing Pulling Units. Complete line of equipment. Units made to your specifications. Truck Mountings or Skid Units. Repair Service and Parts

OKLAHOMA MACHINE & SUPPLY CO
Ada, Oklahoma

FOR SALE

DIESELS AND PUMPS

3—New unused 475 BHP 5 cylinder Baldwin Model VG Diesel Engines, one connected to Ingersoll-Rand Multi-stage Centrifugal Pump with Farrell-Birmingham Step-up Gear and two connected to Worthington Horizontal Triplex Double Acting Pumps, all units complete with Falk couplings, Lummus Coolers, other accessories. Location Ohio, immediate shipment. Direct inquiries to

THE BUCKEYE PIPE LINE COMPANY
Joseph Steele, Purchasing Agent,
Room 2200, 30 Broad St., New York 4, N. Y.

EQUIPMENT FOR SALE

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HELP WANTED

WANTED—Geologist with at least six years' experience in Texas Gulf Coast Area. Box C-758, The Oil and Gas Journal, Tulsa, Oklahoma.

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Large independent producing and refining company has position of Controller-Auditor open. Must have experience in taxes, producing and refining operations. State full qualifications and experience. C-823, The Oil and Gas Journal, Tulsa, Oklahoma.

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PETROLEUM Engineer desires position in Mid-Continent area. Three years' experience in well completions, work-over operations, production problems, and reservoir engineering. Can take over duties of production superintendent. Available April 1, 1949. Box C-814, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Experienced in subsurface and well Geology, also some experience in petroleum engineering, desires position in Rocky Mountain area. Single, age 30, available in May 1949. Box C-781, The Oil and Gas Journal, Tulsa, Oklahoma.

OILFIELD supply executive with wide acquaintance in the Gulf Coast area desires change. Twenty years' experience in every phase of the petroleum supply business. Would consider responsible, executive position with some good supply company or oil company, needing man with these qualifications. Can furnish best of references. Box C-807, The Oil and Gas Journal, Tulsa, Oklahoma.

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CHEMICAL Engineer, 8 years plant and laboratory experience, 3 years high pressure pilot plant operation. Box C-824, The Oil and Gas Journal, Tulsa, Oklahoma.

OILFIELD supply executive interested in establishing himself as Manufacturer's Representative in Mid Continent area only. Eleven years' experience in all phases of supply business. Well acquainted. Age 33. Box C-821, The Oil and Gas Journal, Tulsa, Oklahoma.

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WE have some good drilling blocks, close in leases to good production. Will take small override, in Clinton County oil field. John A. Damron, Albany, Kentucky.

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Established manufacturer's agent seeks additional representation in Texas, Oklahoma, and Gulf Coast area. Specializes in electrical and electronic instruments for Petroleum and Chemical Industries. Box C-819, The Oil & Gas Journal, Tulsa, Oklahoma.

Southwest Texas Fields

(Continued from page 151)

John Alexander Est., in Jesus Billingsley Sur., 2 mi. S of Bastrop, dry, TD 1,696 ft.

Sun Oil Co. 1 Martin, 3 mi. S of Cedar Creek townsite, in J. G. Welchmeyer Sur., dry, TD 2,353 ft.

Cameron County: Ashland Oil & Refg. Co. & A. W. Smith, Trustee, et al 1 Shannon Bros. & Fritz Zamponi, Block 33, Raop Subd., 1¼ mi. SW of LaFeria, dry, TD 8,526 ft.

Duval County: Blanco Oil Co. & Al Buchanan 2 Francisco Lopez, 3½ mi. S of Lopez field, in L. Lopez Sur. 66, dry, TD 3,686 ft.

Bridwell Oil Co. B-1 J. T. Dinn, in J. F. Lewis Sur. 387, 2¼ mi. S-SE of Cam field, dry, TD 2,875 ft.

Cresslenn Oil Co. et al 1 F. Vaello, Block 40, Copita Farm & Garden Tracts 2, in Jose Marcello Ynojose Gr., 3 mi. NW of Sejita, dry, TD 6,006 ft.

Jim Hogg County: Killam & Hurd 1 Marrs McLean, Sur. 614, 2 mi. N-NE of Randado field, 1½ mi. NE of Manila field, dry, TD 2,676 ft.

Travis County: E. R. Marts 1-A B. H. Bloor, in Wm. Saunders Sur., 8 mi. E of Austin, dry, TD 1,340 ft. in Edwards lime.

Webb County: O. W. Killam 1 Bruni Est., Block 61, Brown Subd., Albercas Gr., 1½ mi. E of Albercas field, dry, TD 2,834 ft.

O. W. Killam 2 Bruni Est., Block 62, Brown Subd., Albercas Gr., 1 mi. E of Albercas field, dry, TD 3,268 ft.

Williamson County: Henry Barnes 2 Martha Bachmeyer, in Hamilton White Sur., dry, TD 1,013 ft.

H. C. Lefors 1 F. E. Holman, in Thomas A. Moore Sur., 2½ mi. NE of Coupland, 5 mi. SE of Taylor, dry, TD 1,504 ft. in Austin chalk.

Puma Oil & Gas Co. 1 Isadore Krohovjak, in Pedro Zarza Sur., 4½ mi. SE of Granger, dry, TD 925 ft. in Georgetown lime.

D. B. Scully 1 J. F. Bowers et al, Pedro Zarza Sur., 9 mi. NE of Taylor, dry, TD 1,354 ft. Top Edwards lime 1,343 ft.

H. B. Snyder 1 L. E. Bartlett, in Pedro Zarza Sur., 9 mi. NE of Taylor, dry, TD 597 ft. in Austin chalk.

Zapata County: Bridwell Oil Co. & W. C. McBride, Inc., A-8 Robt. Hinnant, in SK&K Sur. 126, ½ mi. N of Mirando Valley field, dry, TD 2,232 ft.

Interstate Minerals Corp. 70 Rufino Lopez, in J. H. Gibson 111 Sur., 10 mi. SW of Mirando City, dry, TD 1,603 ft.

A. G. Myers 1 F. G. Martinez (Trevino), in McCullough Subd., El Grullo Gr., 25 mi. NW of Zapata, dry, TD 1,716 ft.

FOR SALE—MAPS

FOR SALE—MAPS

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CALENDAR

March

American Petroleum Institute, Southwestern district, Galvez Hotel, Galveston, Tex., March 9-11.

American Association of Petroleum Geologists, regional meeting; Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, Jefferson Hotel, St. Louis, Mo., March 14-17.

American Petroleum Institute, division of production, Mid-Continent district meeting, Mayo Hotel, Tulsa, March 23-25.

New England Gas Association, Hotel Statler, Boston, March 24-25.

Illinois Oil and Gas Association, annual meeting, Hotel Emmerson, Mount Vernon, Ill., March 25.

North Texas Oil and Gas Association, annual meeting and secondary-recovery forum, Hotel Kemp, Wichita Falls, Tex., March 25-26.

Western Petroleum Refiners Association, thirty-seventh annual meeting, Plaza Hotel, San Antonio, Tex., March 28-30.

American Chemical Society, division of petroleum chemistry, spring meeting, San Francisco, March 27-April 1.

April

Texas Independent Producers and Royalty Owners Association, Houston, April 1.

American Petroleum Institute, division of refining, mid-year meeting, Shamrock Hotel, Houston, April 4-7.

American Society of Lubrication Engineers, annual meeting, Pennsylvania Hotel, New York, April 11-13.

National Association of Corrosion Engineers, annual convention, Netherlands Plaza Hotel, Cincinnati, Ohio, April 11-14.

Southwestern Gas Measurement Short Course, University of Oklahoma, College of Engineering, Norman, Okla., April 12-14.

National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 13-15.

Natural Gasoline Association of America, annual meeting, Texas Hotel, Fort Worth, April 20-22.

Southern Gas Association, annual convention, Buena Vista Hotel, Biloxi, Miss., April 20-22.

Petroleum Industry Electrical Association, Petroleum Electrical Supply Association, annual convention, Mayo Hotel, Tulsa, April 26-28.

American Petroleum Institute, eastern district, William Penn Hotel, Pittsburgh, Pa., April 27-29.

May

Independent Petroleum Association of America, midyear meeting, Roosevelt Hotel, New Orleans, La., May 3-4.

American Petroleum Institute, division of marketing, midyear meeting, Jefferson Hotel, St. Louis, May 9-10.

American Gas Association, natural-gas department, spring meeting, French Lick Springs Hotel, French Lick, Ind., May 9-10.

Interstate Oil Compact Commission, spring quarterly meeting, Roosevelt Hotel, Jacksonville, Fla., May 9-11.

American Institute of Chemical Engineers, regional meeting, Mayo Hotel, Tulsa, May 9-11.

Liquefied-Petroleum Gas Association, annual convention, Palmer House, Chicago, May 9-11.

American Petroleum Institute, division of production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, Calif., May 12-13.

Instrument Society of America, annual spring meeting, Royal York Hotel, Toronto, Canada, May 12-13.

Oil-Heat Institute of America, national oil-heat exposition and annual convention, Boston, Mass., May 16-20.

American Petroleum Institute, Rocky Mountain district, Gladstone Hotel, Casper, Wyo., May 26-27.

Natural Gas and Petroleum Association of Canada, annual meeting, Hotel London, London, Ont., Canada, May 26-27.

Fourth Annual Short Course in Gas Technology, sponsored by Southern Gas Association, Texas A. & M. College, Kingsville, May 30-June 1.

June

Petroleum Equipment Supplier's Association, annual meeting Broadmoor Hotel, Colorado Springs, Colo., June 5-7.

American Society for Testing Materials, fifty-second annual meeting, Hotel Chalfonte Haddon Hall, Atlantic City, N. J., June 17-July 1.

Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh, Pa., June 16-17.

September

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 14-16.

American Association of Oilwell Drilling Contractors, ninth annual meeting, Baker Hotel, Dallas, September 19-21.

October

American Society of Mechanical Engineers, petroleum division, 1949 Petroleum Mechanical Engineering Conference, Biltmore Hotel, Oklahoma City, October 2-5.

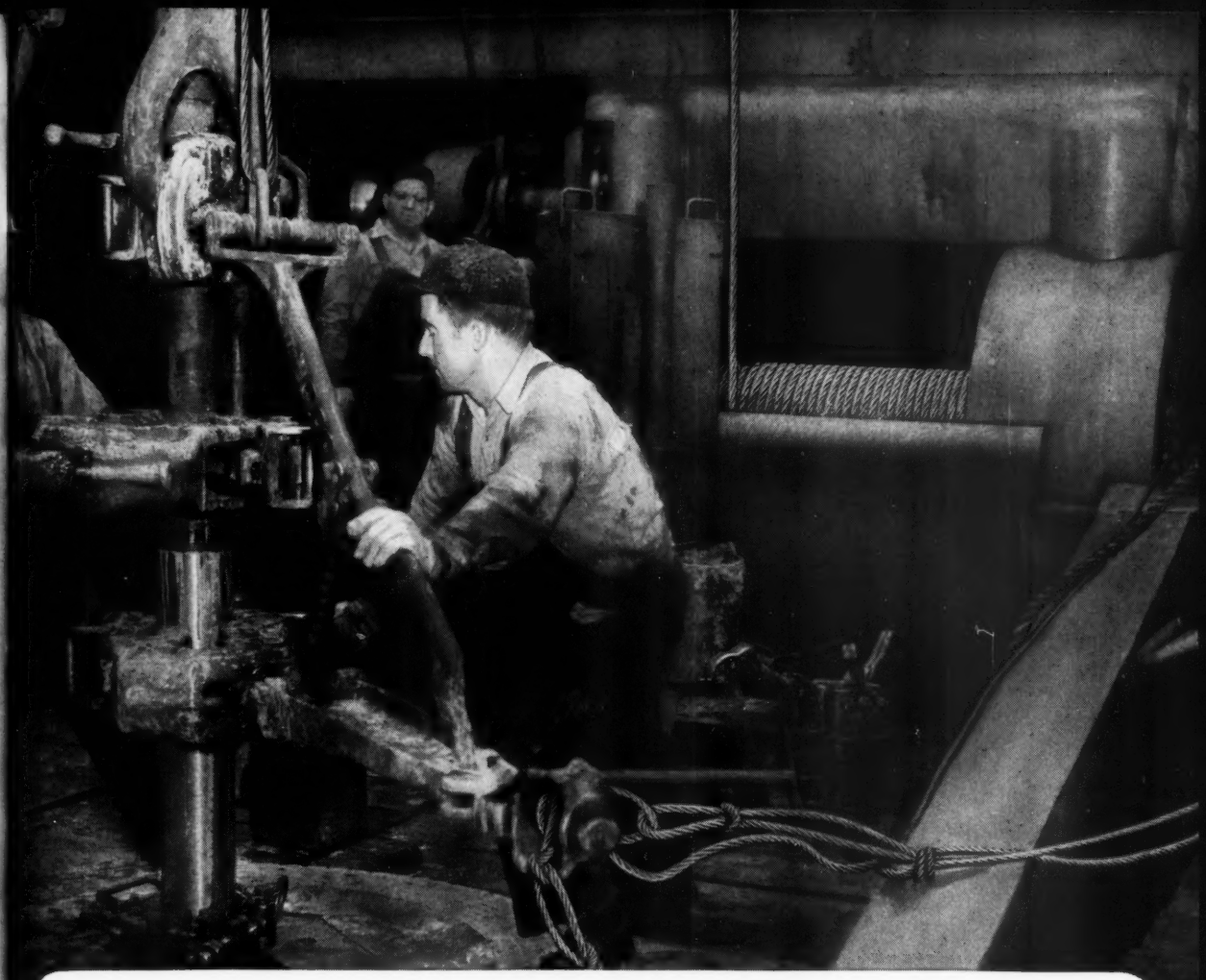
National Lubrication Grease Institute, Hotel Roosevelt, New Orleans, La., October 3-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Rice Hotel, Houston, October 13-14.

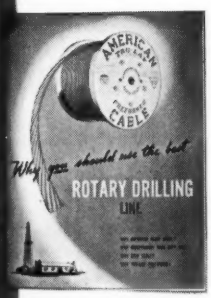
NOMADS

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday each month, Jonathan Club.



Here's the ROTARY DRILLING LINE FOR YOU ...TRU-LAY *Preformed!*



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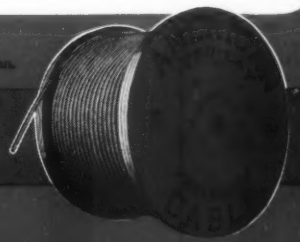

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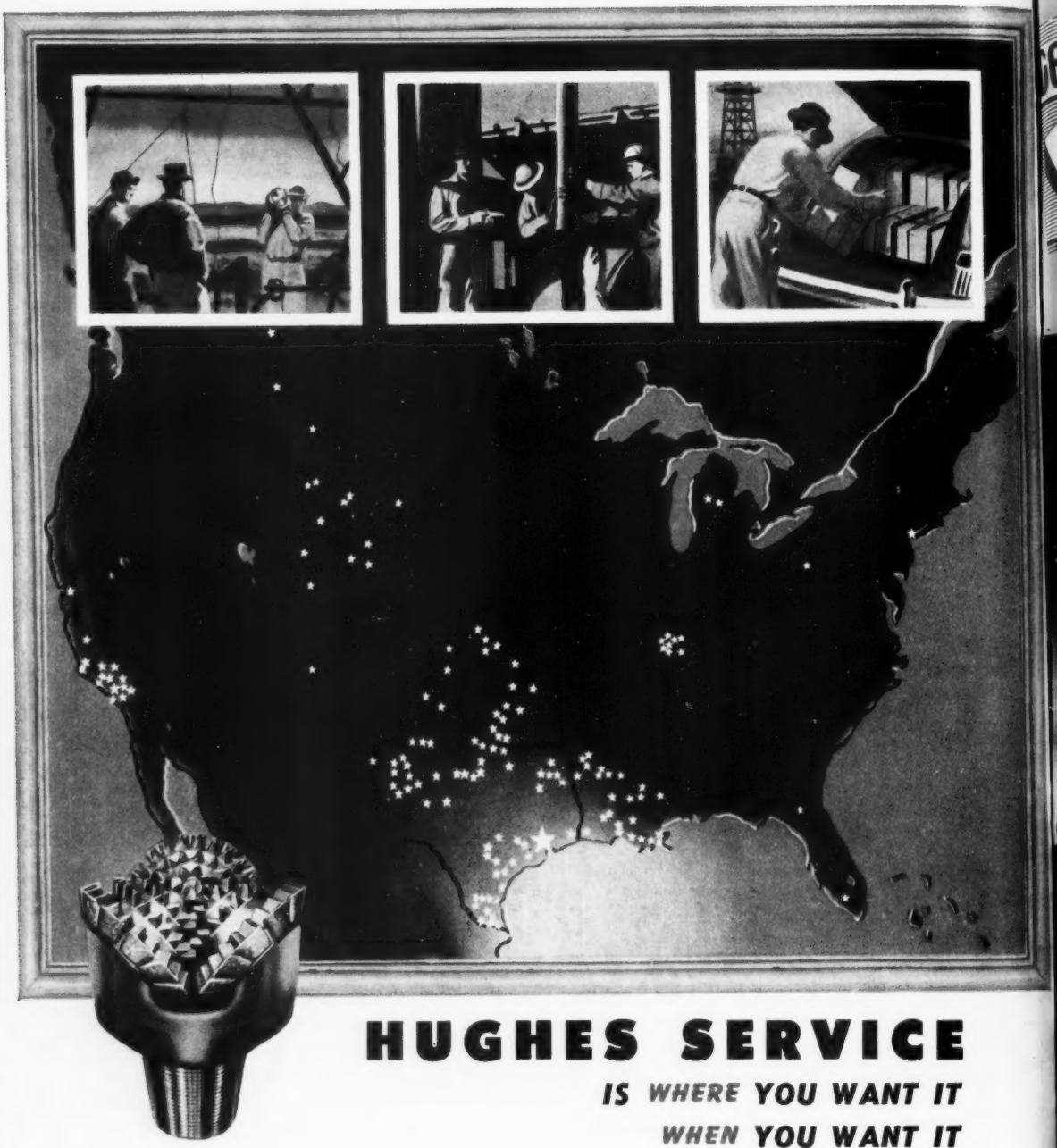

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